

Cat. No. 32-2033A

OWNER'S MANUAL

Please read before using this equipment.

MPA-25

**20-watt AC/Mobile
PA Amplifier**

—REALISTIC®

FEATURES

Your new REALISTIC® MPA-25 AC/Mobile PA Amplifier gives you 20 watts of solid power for your P.A. system. Its wide frequency response — 150 Hz to 20 kHz — makes it suitable for music as well as voice. It operates on either 120V AC or 12V DC power so that you can use it whenever and wherever you need great sound.

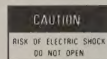
Other features you'll appreciate:

- Individual controls for Microphone 1, Microphone 2, and PHONO/AUX.
- MASTER VOLUME control that adjusts the overall level of all sound sources.
- TONE control that lets you adjust high frequencies and customize your sound depending on the speakers, sound source, and room acoustics.
- 70-Volt line output for line transformers that makes connecting a multiple-speaker system easy.
- AUX and PHONO inputs let you use a tape recorder, receiver, or phonograph for music and special effects.

Read this manual carefully. It leads you through the various speaker connections to help you select the best arrangement for your system. The "Using your MPA-25" section gives easy-to-follow instructions on using your new P.A. system.

For your personal records enter the serial number of your unit here: _____

WARNING: To reduce the risk of fire or electric shock, do not expose this appliance to rain or moisture.



CAUTION: TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT REMOVE COVER (OR BACK). NO USER-SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.



The lightning flash with arrowhead symbol within an equilateral triangle is intended to alert the user to the presence of uninsulated dangerous voltage within the product's enclosure.



The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

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SYSTEM CONNECTIONS

Dynamic
Microphone

Dynamic
Microphone

To DC

(+) (-)

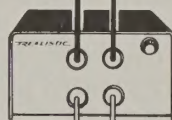
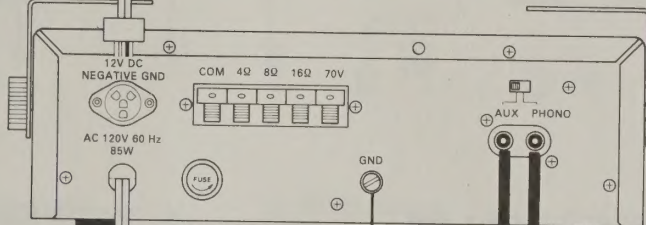
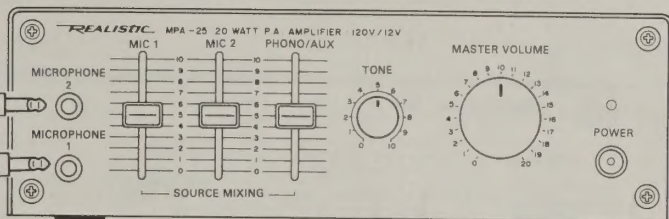
To AC

Tuner

Use
← Y-Adapter.

Magnetic
Cartridge
Pre Amp

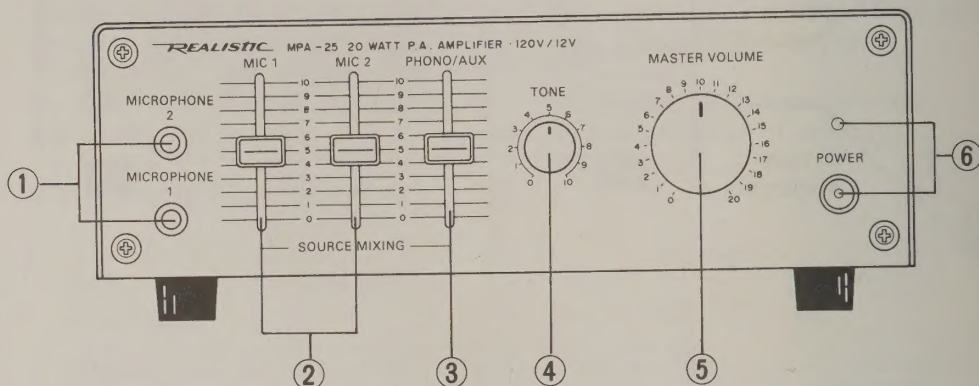
Turntable with
Magnetic Cartridge



Note: For speaker connections,
refer to page 7 through page 13.

CONTROLS AND FUNCTIONS

FRONT PANEL



1. MICROPHONE 1 and MICROPHONE 2 Inputs

Connect any standard high- or low-impedance microphones with 1/4" (6.3mm) plugs.

2. MIC 1 and MIC 2 SOURCE MIXING Controls

Adjust the input level for each of the two microphones.

3. PHONO/AUX SOURCE MIXING Control

Adjusts the input level of the PHONO or AUX sound source.

4. TONE Control

Adjusts the sound quality according to the speakers, the sound source, and the room acoustics.

5. MASTER VOLUME Control

Controls the overall loudness level of all sources equally.

6. POWER Button and Indicator

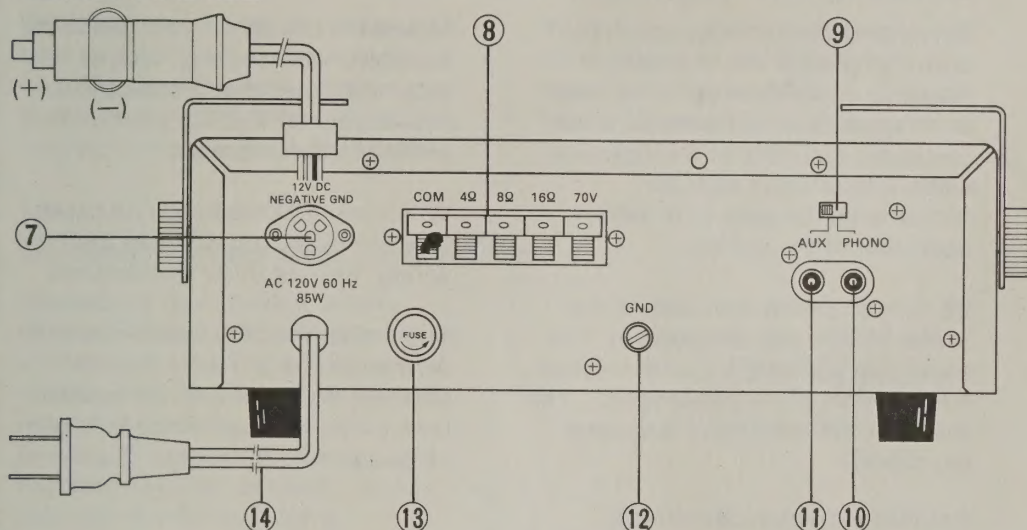
Press in the button to turn on the unit. The indicator lights. Press the button again to turn off the unit.

7. DC Connector

Connect the supplied cable to operate from a 12V DC power source with negative ground only. The other end of the cable is designed to fit an automobile cigarette lighter socket. The supplied cable is equipped with a 4A, 125V fuse (in line) to protect your amplifier from voltage surges and abnormal conditions. If the power indicator does not light when the power button is depressed, check the fuse, and, if necessary, replace it with one of the same size and value.

Note: Disconnect DC when AC on use.

REAR PANEL



8. Speaker Push Terminals

Provide connection for your speaker system.

9. AUX/PHONO Rear Panel Switch

Selects either AUX or PHONO input.

10. PHONO Input

Connects a turntable with a crystal or ceramic cartridge to your system. (If your turntable is equipped with a magnetic cartridge, you will need a preamp, such as Cat. No. 42-2109 (not available in U.K.).

11. AUX Input

Connects any high-level sound source, such as a tape deck or a tuner, to the system.

Note: You can connect both PHONO and AUX input sources at the same time, but you can use only one source at a time.

12. GND Screw

Connect the ground wire (usually black or green) from your turntable to this screw to avoid hum. You can also use this screw to ground any other system connection.

13. Power FUSE

Protects your amplifier from voltage surges and abnormal operating conditions when operating the unit from an AC power source. If the power indicator does not light, check the fuse. If necessary, replace it with one of the same size and type (USA: 2A, 250V; UK and Australia: 1A, 250V). A spare fuse is taped to the unit. Be sure the power cord is disconnected when replacing the fuse.

14. AC Cord

Supplies the MPA-25's power. Plug it into any standard outlet.

INSTALLATION

Installing the MPA-25 in Your Vehicle

Safety and convenience are the primary considerations when installing your PA amplifier in a car or other vehicle. All controls must be readily available to the operator without interfering with the movements necessary for safe operation of the vehicle.

Be sure all cables are clear of the brake, clutch, and accelerator. You must also consider the convenience and comfort of the passengers. (For example, will they have adequate leg room?)

Another extremely important requirement is the ease of installation and removal (for service and maintenance). Mount your MPA-25 so that you can slip it in and out easily.

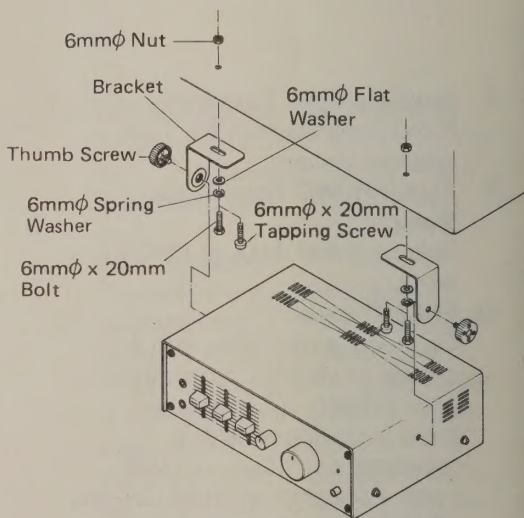
The most common mounting position for a PA amplifier is under the dashboard directly over the drive shaft hump. Do not mount your MPA-25 in the air stream path of a heater or air conditioner.

When you determine the best mounting location, install the mounting brackets (L and R) temporarily to measure the distance between the left and right bracket holes, and mark the mounting holes.

Mount the brackets in position with the bolts, washers and nuts, or tapping screws that are supplied. Attach your MPA-25 to the brackets with the thumb screws.

When you drill the holes, be careful so that you do not drill into the wiring, trim, or other accessories.

You'll also need PA speaker(s) and wire (available at Radio Shack). Connect the speaker(s) as outlined later in the manual. Be sure to use 16-gauge wire or larger.



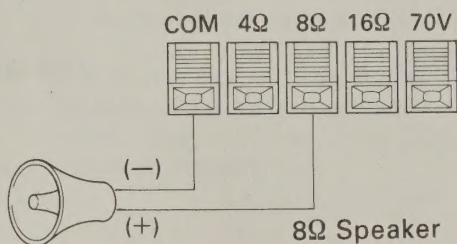
Installing the MPA-25 in a Fixed Location

Don't place your amplifier near a heat source (vent, radiator and so on). Provide adequate ventilation. Avoid placing it on a thick shag carpet; this can restrict the air flow.

You'll need speakers and wire (available at Radio Shack) to complete your installation. Be sure to use 16-gauge wire or larger.

CONNECTING ONE SPEAKER

Connecting one speaker is very simple. Connect the minus (—) side of the speaker to the COM terminal on the amplifier. Connect the plus (+) side of the speaker to the terminal that matches the impedance of the speaker. In our example the 8Ω speaker is connected to the 8Ω terminal.



CONNECTING TWO OR MORE SPEAKERS

There are two ways to connect multiple speakers. The first way is to connect them without transformers. This method usually involves using fewer speakers and short runs of wire (essentially no longer than 50 feet (15m)). The second way is to connect the speakers with transformers. You might want this method with a system that requires many speakers and longer runs of wire.

Note: The longer the run of speaker wire, the heavier the gauge of wire you should use.

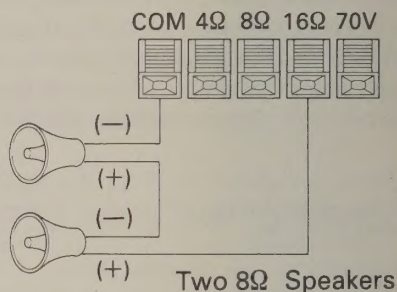
When making connections without transformers, all the speakers must have the same impedance rating to ensure equal volume from each speaker. You will notice all the speakers used in the examples are 8Ω. This is the type of speaker sold by Radio Shack.

For a system to operate at peak performance, you must observe **impedance matching** during the connection of speakers. This means that the total impedance of all the speakers must match the output impedance on the amplifier. (Impedance is measured in ohm and is designated by the ohm (Ω) symbol.)

Connecting Speakers in Series

When there is more than one speaker in a sound system, you must determine the total impedance of the speakers before you can make the correct connection.

In the example, two 8-ohm speakers are connected in series. To determine the total impedance of speakers connected in series, add the impedance of all the individual speakers.



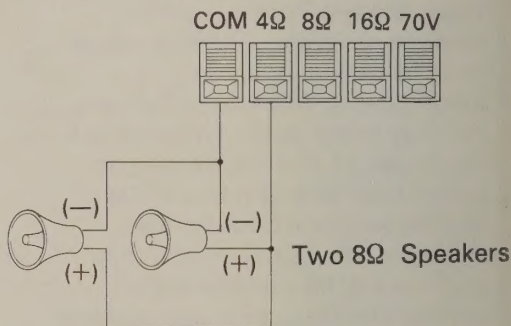
$$\Omega \text{ of Speaker 1} + \Omega \text{ of Speaker 2} = \text{Total } \Omega$$

$$8\Omega + 8\Omega = 16\Omega$$

Connecting Speakers in Parallel

To arrive at the correct impedance for connecting speakers in parallel, as in the example, divide the number of speakers (two) into the impedance of a single speaker (8 ohm).

Note: All speakers must have the same impedance when connecting in parallel.



$$\frac{\Omega \text{ of 1 Speaker}}{\text{No. of Speakers}} = \text{Total } \Omega$$

$$\frac{8 \Omega}{2 \text{ Speakers}} = 4\Omega$$

Combining Series and Parallel Connections

If you must hook up more than two speakers you might have to use a combination of series and parallel to obtain a final (total) impedance that matches the connection terminal on the amplifier.

Remember, improper connection can damage the system.

For example, four 8-ohm speakers, connected in series, result in a total of 32 ohm, which is greater than the total allowed by the amplifier (16 ohm).

Impedance in Series

$$8\Omega + 8\Omega + 8\Omega + 8\Omega = 32\Omega$$

And, if you merely connect four speakers in parallel, the impedance is less than allowed by the amplifier (4 ohm).

Impedance in Parallel

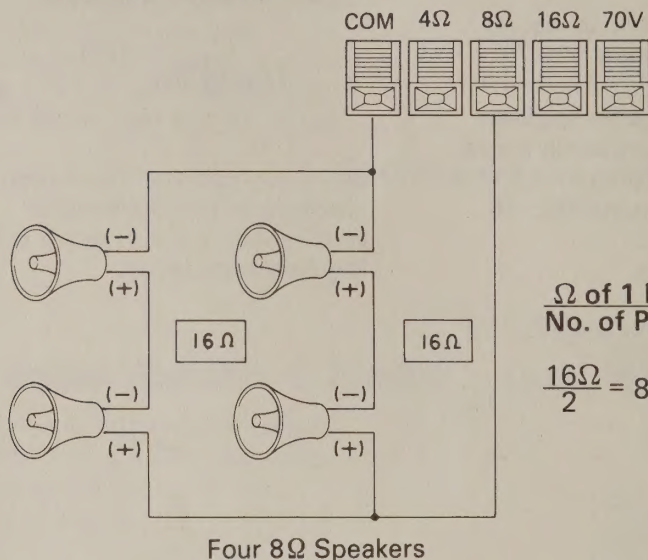
$$\frac{8\Omega}{4 \text{ Speakers}} = 2\Omega$$

But, if you connect four 8-ohm speakers in a series/parallel combination you can arrive at the required impedance.

First, connect each pair of speakers in series. In our example below, each pair has a total impedance of 16 ohm.

Next, connect the two pairs of speakers in parallel.

To arrive at the total impedance of the four speakers, divide the impedance of one pair (of speakers) by the number of pairs. In our example, the impedance of one pair (16Ω) is divided by the number of pairs (2).



$$\frac{\Omega \text{ of 1 Pair}}{\text{No. of Pairs}} = \text{Total } \Omega$$

$$\frac{16\Omega}{2} = 8\Omega$$

Notes:

- Never use a speaker impedance higher or lower than the specified impedance that the amplifier can handle. If you do so, you might damage your speakers and amplifier.
- Never use a speaker with an impedance rating lower than 4 ohms. Never use any combination of speakers that has an impedance less than 4 ohms or greater than 16 ohms.

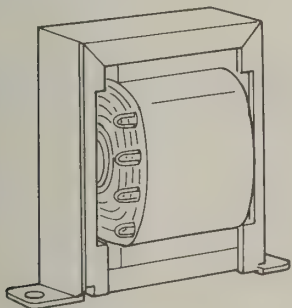
Using Transformers

Transformers are used for complex multiple-speaker arrangements that require long runs of connecting wire.

Remember: You might need to use heavier wire when running longer lengths.

There are several advantages to using transformers. You can use speakers of different impedances without causing differences in output between them. You can also add or subtract a speaker without having to recalculate the impedance for the entire system.

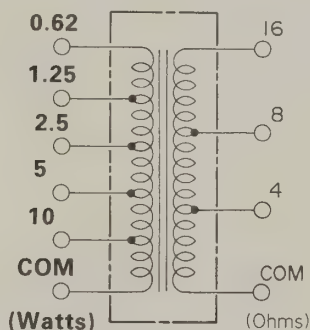
Your MPA-25 uses Radio Shack's Line Transformer, Cat. No. 32-1031, and you need a separate transformer for each speaker.



Primary Taps

The line transformers have multiple connectors, generally referred to as taps. There is one set of taps on each side of the transformer. One set is the primary side, and the taps on this side are marked in watts: 10, 5, 2.5, 1.25, and 0.62.

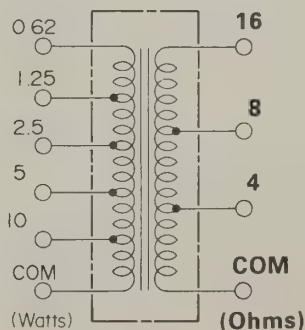
One of these taps is connected to the 70-Volt line of your amplifier. The COM connector on the primary side is connected to the COM connector on your amplifier.



Secondary Taps

The opposite side of the transformer is called the secondary and its taps are marked in ohms: 4, 8, and 16 Ω .

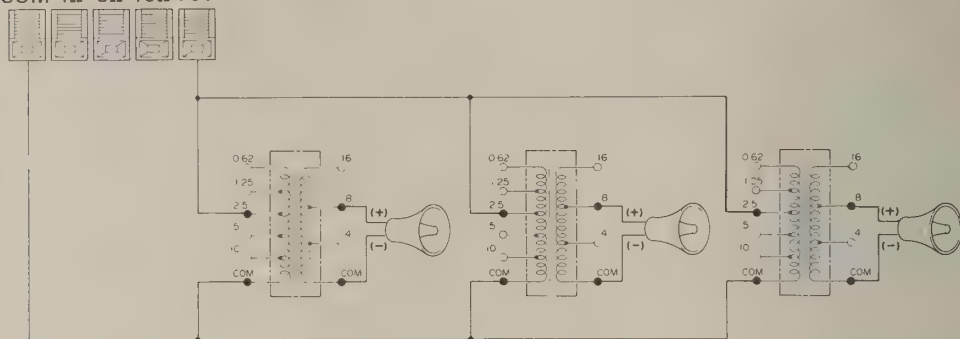
You match the secondary tap with your speaker impedance when connecting the transformer to your speaker. The COM connector on the secondary side is connected to the minus (—) terminal on the speaker.



Normally the wattage connections on the primary side of the transformer are the same for all speakers. If you want a particular speaker to have a higher volume level, use a higher wattage tap on the primary connection of its transformer.

Before connecting the speakers, be sure that the total wattage of all primary taps does not exceed the amplified power rating (20 watt). For example, the wattage in the following example is $2.5 + 2.5 + 2.5 = \text{total } 7.5$.

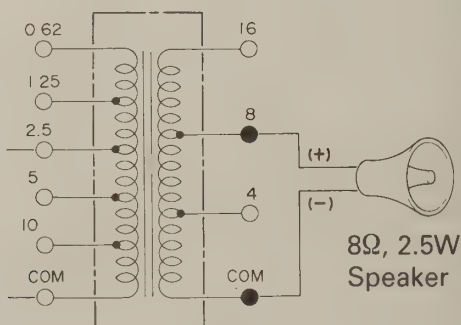
COM 4Ω 8Ω 16Ω 70V



Three 8Ω, 2.5W Speakers

Connecting the Secondary Taps

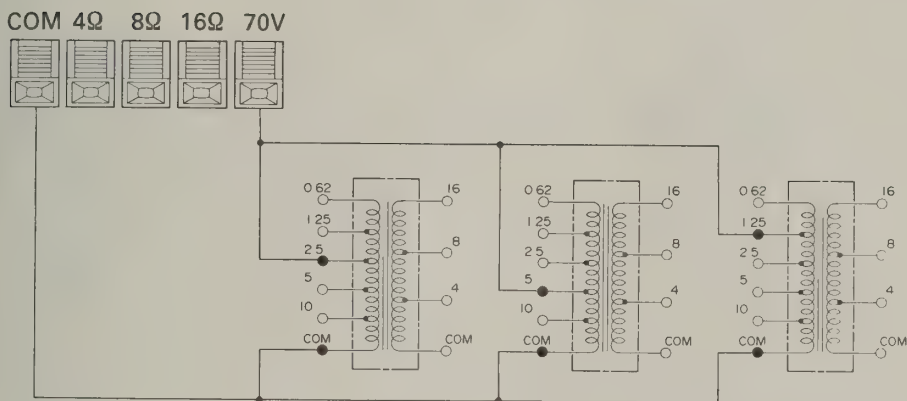
1. Connect the plus (+) terminal of the speaker to the secondary tap on the transformer that matches the speaker's impedance.
2. Connect the minus (—) terminal of the speaker to the COM terminal on the transformer.



Connecting the Primary Taps

1. Connect the desired wattage tap on the primary side of the transformer to the 70-Volt amplifier output.
2. Connect the COM terminal on the primary side of the transformer to the COM terminal on the amplifier.

Note: Use connections as shown below to avoid multiple connections to the amplifier terminal.



SPEAKER PHASING

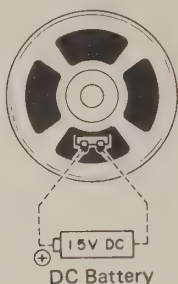
Speaker phasing is the direction the cone moves with reference to the polarity of the connecting wires. Out-of-phase speakers can reduce volume level considerably and can create an adverse effect on the base response. So, it is critically important when multiple speakers are close together, to have the speakers properly phased.

In general, speakers are **in phase** if all the speaker cones move in the same direction when an equal signal is applied. Correct phasing is accomplished by observing the correct polarity when connecting the speakers.

If the speakers are unmarked, or they are not the same model, the following procedure lets you determine the polarity of the speaker terminals.

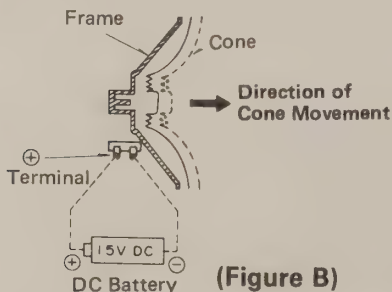
Continued next page

1. Connect one end of a 1.5V flashlight battery to one of the speaker terminals (Figure A).
2. Momentarily make contact between the opposite end of the battery and the other speaker terminal. Note the direction of the cone movement, inward or outward.



(Figure A)

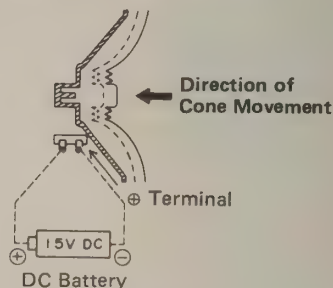
3. Refer to Figures B and C. If the speaker cone moves outward (Figure B), the terminal connected to the positive side of the battery is plus.



(Figure B)

If the cone moves inward (Figure C), the terminal connected to the negative side of the battery is plus. Mark the terminal that

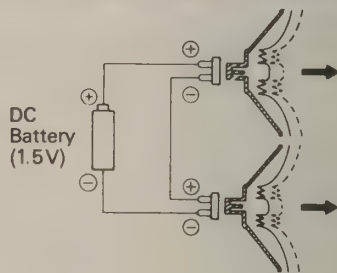
is positive with a plus sign.



(Figure C)

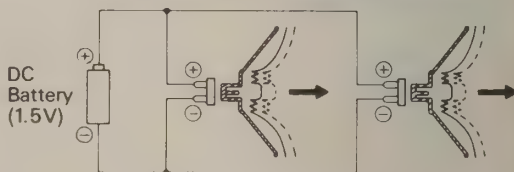
4. Repeat the same procedure for each successive speaker, and be sure to mark the correct terminal for the direction of the cone movement in each case.
5. Referring to Figures D and E, connect the terminal in accordance with your speaker wiring.

Proper Phasing for Series Connection



(Figure D)

Proper Phasing for Parallel Connection

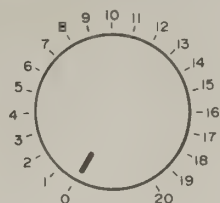


(Figure E)

USING YOUR MPA-25

1. To protect your speakers, always set the MASTER VOLUME control and the MIXING controls to zero before turning on the power.

MASTER VOLUME



2. Push in the POWER button.

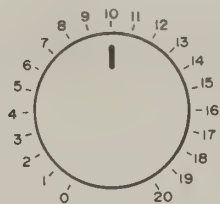


POWER

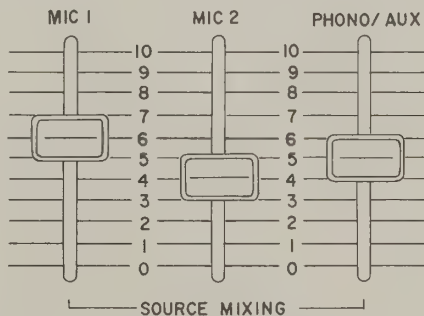


3. Set the MASTER VOLUME control to about 10. Then, adjust the individual source mixing controls as required for proper gain.

MASTER VOLUME



4. Adjust the individual SOURCE MIXING controls (MIC 1, MIC 2, and PHONO/AUX) to get the proper volume and balance. 0 is off and 10 is the maximum. A little experimentation will soon give you the right feel for smooth mixing and fading.



5. Set the TONE control at position 10. You might need to vary this depending on the room acoustics and your personal preference. If feedback is a problem, try a lower setting.

TONE



TROUBLESHOOTING

If you should run into difficulties, check the wiring of the system. Are there any short circuits in the speaker wiring? Have you provided adequate ventilation? Did you calculate speaker impedance correctly?

Be sure there is no defective microphone or connecting cable.

Be sure you are using large enough speaker wire. You should always use 16 gauge (or larger) wire. The longer the run of speaker wire, the heavier the gauge should be.

If you have feedback problems, reposition your microphones and speakers.

If the MPA-25 does not work at all, check the fuse on the rear panel. If it is blown, replace it with one of the same size and type.

If you are operating the MPA-25 from 12V DC power source, check the fuse in the supplied cable that connects to the automobile cigarette lighter socket. If it is blown, replace it with a 4A, 125V fuse.

If none of the above suggestions solve the problem and you still have difficulties, please take the unit to your local Radio Shack store. The personnel there will assist you and, if necessary, arrange for service.

MAINTENANCE

Your MPA-25 Public Address Amplifier is an example of superior design and craftsmanship and should be treated with care. The suggestions below will help you enjoy this product for many years.



Keep it dry. If water should get on it, wipe it off. Water contains minerals that can corrode electronic circuits.



Do not store in hot areas. High temperatures can shorten the life of electronic devices, and warp or melt certain plastics.



Do not drop it, this might cause permanent damage. The circuit boards and case can be broken.



Do not use or store it in dusty, dirty areas. This will cause premature wear of moving parts.

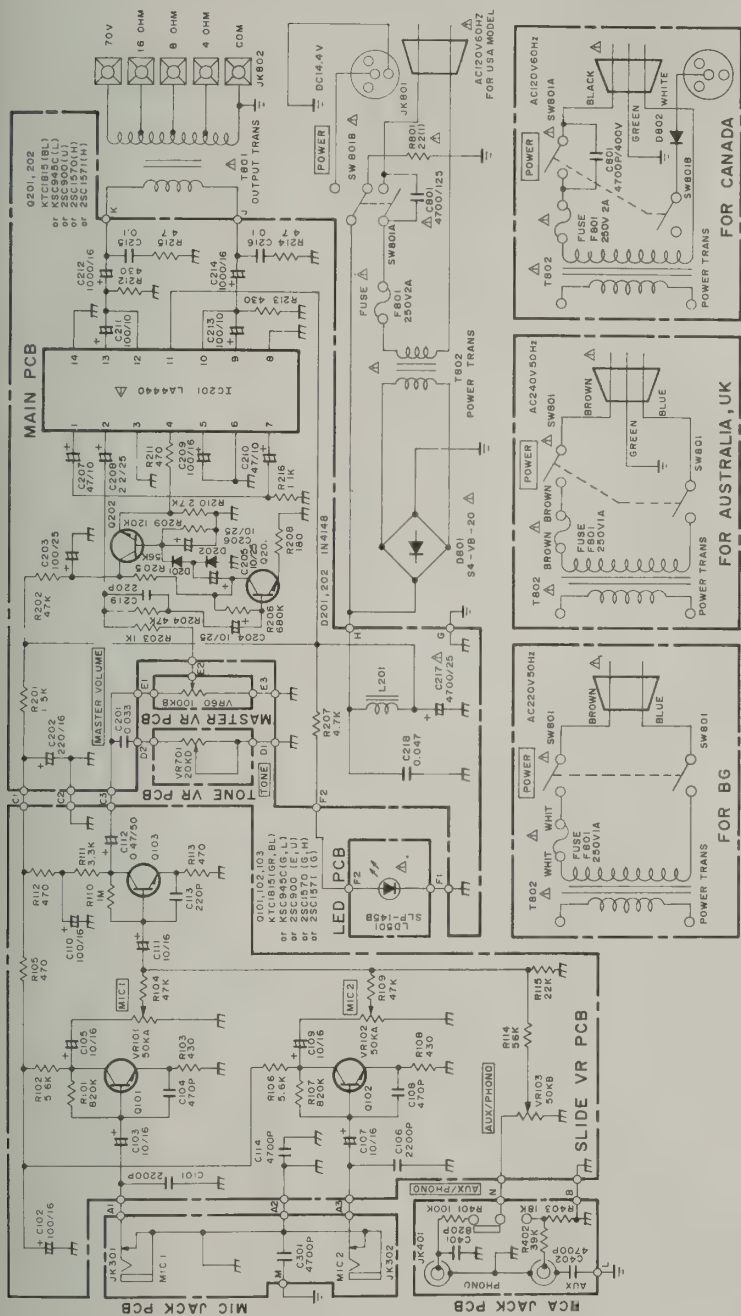


Do not use harsh chemicals, cleaning solvent, or strong detergents to clean it. Wipe it with a soft cloth dampened in a mild soap and water solution.

SPECIFICATIONS

Output Power at 1 kHz, 10% THD	20 watts
Power Bandwidth at 8W, 10% THD:	
AC operation	80 Hz — 50 kHz
DC operation	100 Hz — 50 kHz
T.H. Distortion at 5W, 1 kHz	1%
Input Sensitivity at 16W, 1 kHz:	
MIC 1 and 2	2.5mV
PHONO and AUX	150mV
Signal to Noise Ratio:	
MIC 1 and 2 (Input shorted)	60 dB
PHONO and AUX (4.7k ohm terminated)	65 dB
Tone Control Effect (High Cut) at 10 kHz	—15 dB
Ref. Freq.: 1 kHz = 0 dB (16W)	
Frequency Response at 0.5W	+1 dB, —5 dB
(at AUX, 150 Hz to 20 kHz)	
Hum and Noise	
at VR Min.	3mV
at VR Max. (4.7k ohm terminated at AUX)	30mV
Dimensions	$3\frac{3}{8}"$ (H) x $10\frac{5}{8}"$ (W) x $7\frac{1}{4}"$ (D)
	(85 x 270 x 185 mm)
Weight	8.8 lbs (4 kg)
Power Requirement:	
120V AC, 60 Hz for U.S.A. models	
240V AC, 50 Hz for U.K./Australian models	
12V DC for all destinations	
Accessory: DC Connection Cable	
1 set of Bracket	
Nut	2 pcs
Thumb Screw	2 pcs
Flat Washer	2 pcs
Spring Washer	2 pcs
Tapping Screw	2 pcs
Bolt	2 pcs

SCHEMATIC DIAGRAM





Schematic subject to change without notice. For most accurate schematic (and parts) contact Radio Shack, National Parts Dept., Fort Worth, TX 76101.

In UK, contact Tandy UK, National Parts Dept., Bilston Road, Wednesbury, West Midlands WS10 7JN.

In Australia, contact InterTAN Australia Ltd, National Parts Dept., 91 Kurrajong Avenue, Mount Druitt, N.S.W. 2770.

Warning: To prevent fire or shock hazard, do not expose this product to rain or moisture.

	CAUTION RISK OF ELECTRIC SHOCK. DO NOT OPEN.	
CAUTION: TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT REMOVE COVER OR BACK. NO USER-SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED PERSONNEL.		



This symbol is intended to alert you to the presence of uninsulated dangerous voltage within the product's enclosure that might be of sufficient magnitude to constitute a risk of electric shock. Do not open the product's case.



This symbol is intended to inform you that important operating and maintenance instructions are included in the literature accompanying this product.

This power supply has been tested and found to comply with all applicable UL standards.

Not recommended for outdoor use.

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RadioShack is a trademark used by Tandy Corporation.

FEATURES

Your RadioShack 12-Volt • 10-Amp Regulated Power Supply is designed to power equipment that requires 12V DC automotive power. The power supply converts standard 120V AC household power to 13.8V DC power and can supply up to 10 amps of continuous power.

Note: Your vehicle's 12-volt electrical system provides 13.8 Volts when the engine is running.

If you are an electronic hobbyist or technician, you will appreciate the many uses for the power supply at your workbench or in your house. For example, use your CB mobile transceiver as a base station, check the operation of autosound systems before you install them in your vehicle, or even power marine equipment such as pumps.

Your power supply's features include:

Regulated Output Voltage — makes it safe to use with mobile CBs, scanners, ham radios, CD players, tape players, cellular phones, or anything you would power with a vehicle's DC electrical system.

Electronic Overload Protection — automatically lowers output voltage if the device you are trying to power draws too much current.

Binding Post Terminals — let you connect a device that requires input power from positive and negative wires.

Cigarette-Lighter Socket — lets you connect a device that is designed to be powered from a cigarette-lighter socket.

IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS!

DANGER: TO REDUCE THE RISK OF FIRE OR ELECTRIC SHOCK, CAREFULLY FOLLOW THESE INSTRUCTIONS.

This manual contains important safety and operating instructions for this power supply. Before you use the power supply, read all the instructions and cautionary markings in this manual, on the power supply, and on the product that you will connect to the power supply.

Warning: To reduce the risk of injury:

- Do not use the power supply near water (for example, a bathtub, washbowl, kitchen sink, laundry tub, wet basement, or swimming pool).
- Do not place the power supply on an unstable cart, stand or table. If the power supply falls, it could injure a person or cause serious damage to the power supply.
- Do not overload power outlets or extension cords. An overload can result in fire or electric shock.
- Do not use an extension cord unless absolutely necessary. Using an improper extension cord could result in a risk of fire and electric shock. If an extension cord must be used, make sure:
 - a. The pins on the extension cord's plug are of the same number, size, and shape as those of the plug on the power supply.
 - b. The extension cord is properly wired and in good electrical condition.
 - c. The extension cord's wire size is at least 18 AWG.
- Do not disassemble the power supply; take it to a qualified service technician when service or repair is required. Improper re-assembly may result in a risk of electric shock or fire.

- Do not use an attachment not recommended or sold by RadioShack or this could result in a risk of fire, electric shock, or injury to persons.
- Never push any object into the slot in the power supply. It could touch dangerous voltage points or short out parts resulting in a fire or electrical shock.

Caution: To reduce the risk of damage:

- Do not expose the power supply to rain or excessive moisture.
- Do not operate the power supply if it has been dropped or damaged in any way. Take it to a qualified service technician for repair.
- Slots and openings on the back and bottom of the power supply's cabinet are for ventilation. To ensure the power supply's reliable operation and to protect it from overheating, be sure these openings are not blocked or covered.
- The power supply should be operated only from a standard AC outlet that provides 120V AC/60 Hz, as indicated on the label. If you are not sure of the type of power supplied to your home, consult your local power company.
- For added safety, the power supply's polarized plug (one blade wider than the other) fits only into a polarized outlet. If your AC outlet is not designed for the polarized plug, have an electrician install the correct outlet, or use an adapter to ground the power supply safely. Do not defeat the safety purpose of the plug.
- To protect the power supply during a lightning storm or when it is left unattended and unused for long periods of time, unplug it from the AC outlet. This will prevent damage to the power supply from lightning and power surges.
- Unplug the power supply from the outlet before attempting any maintenance or cleaning. Do not use liquid or aerosol cleaners. Use a damp cloth for cleaning and then wipe it dry immediately.

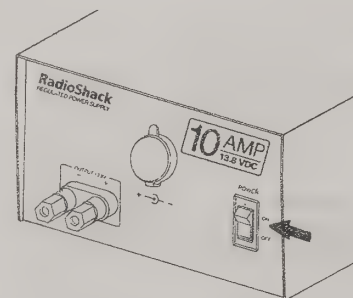
- Do not operate the power supply with a damaged cord or plug — replace them immediately. To reduce the risk of damage to the electric plug and cord:
 - a. Make sure the cord is not located where it will be stepped on, tripped over, or otherwise subjected to damage or stress.
 - b. Disconnect the power supply by pulling the cord's plug rather than the cord.
- If your power supply does not operate normally, in particular if any unusual sounds or smells come from it, immediately unplug it and contact your local RadioShack store.

CONNECTIONS

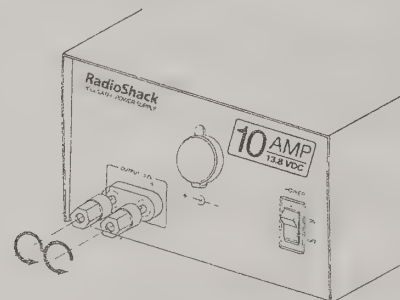
Caution: Make all other connections before you connect the power supply to standard AC power.

CONNECTING A DEVICE REQUIRING POSITIVE AND NEGATIVE WIRES

1. Turn off the device requiring power.
2. Set the power supply's **POWER** switch to **OFF**.



3. Turn the sleeves of the red and black binding output posts counterclockwise to expose the wire holes.



4. Insert the device's positive wire (usually red) into the red binding post's wire hole, then tighten the binding post's sleeve to secure the wire in place.

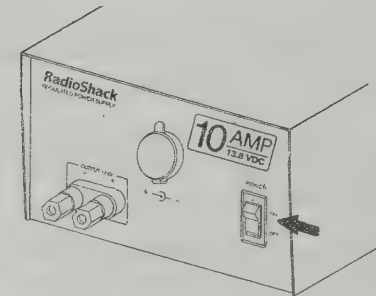
- Do not operate the power supply with a damaged cord or plug — replace them immediately. To reduce the risk of damage to the electric plug and cord:
 - a. Make sure the cord is not located where it will be stepped on, tripped over, or otherwise subjected to damage or stress.
 - b. Disconnect the power supply by pulling the cord's plug rather than the cord.
- If your power supply does not operate normally, in particular if any unusual sounds or smells come from it, immediately unplug it and contact your local RadioShack store.

CONNECTIONS

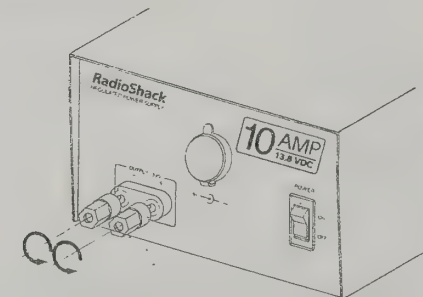
Caution: Make all other connections before you connect the power supply to standard AC power.

CONNECTING A DEVICE REQUIRING POSITIVE AND NEGATIVE WIRES

1. Turn off the device requiring power.
2. Set the power supply's **POWER** switch to **OFF**.



3. Turn the sleeves of the red and black binding output posts counterclockwise to expose the wire holes.



4. Insert the device's positive wire (usually red) into the red binding post's wire hole, then tighten the binding post's sleeve to secure the wire in place.

Warning: To avoid damage to both the power supply and the device:

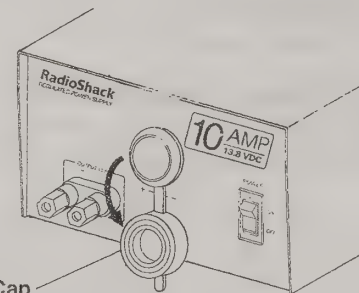
- Follow the correct polarity (+ to + and – to –) when you connect the power supply and the device.
- Do not let the ends of the positive and negative wires touch each other.

Notes:

- The binding posts' wire holes can accommodate wire up to 14 gauge.
 - Your local RadioShack store has a wide selection of banana plugs and hook clips that are convenient for making the connections to the binding posts.
5. Insert the device's negative wire (usually black) into the black binding post's wire hole, then tighten the binding post's sleeve to secure the wire in place.
 6. Plug the power supply's power cord into a standard 120V AC outlet. If you have difficulty inserting the plug, don't force it. Turn it over and reinsert it.

CONNECTING A DEVICE REQUIRING A CIGARETTE-LIGHTER SOCKET

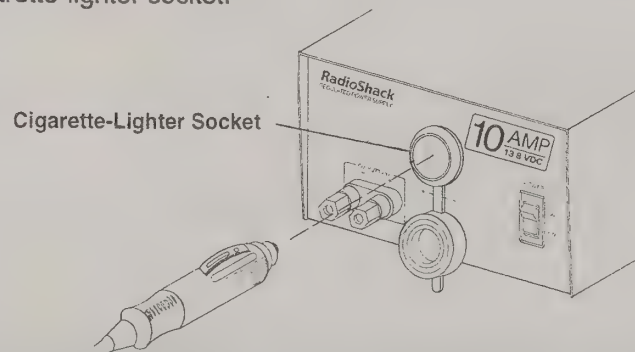
1. Turn off the device requiring power.
2. Set the power supply's **POWER** switch to **OFF**.
3. Pull off the cigarette-lighter socket's cap on the front of the power supply.



Cigarette-Lighter Socket's Cap

Note: Close the socket's cap when you are not using the socket.

4. Plug the device's DC power cord into the power supply's cigarette-lighter socket.



Cigarette-Lighter Socket

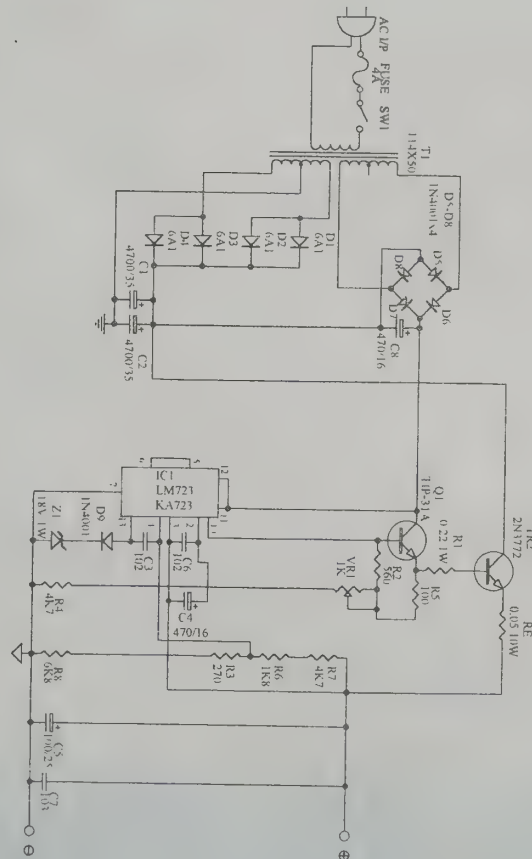
5. Connect the power supply's power cord to a standard 120V AC outlet. If you have difficulty inserting the plug, don't force it. Turn it over and reinsert it.

OPERATION

To use the power supply after you connect the device to it, set **POWER** to **ON** to turn it on.

Note: If the power supply's **POWER** switch does not light:

- Check all connections and confirm the AC outlet has power.
- If the outlet has power, set **POWER** to **OFF**, reduce the load (by using a device that does not require more than 13.8V DC), then set **POWER** to **ON**. Your power supply's overload protection circuit automatically shuts down the power supply when it is overloaded and resets by turning the **POWER** switch to **OFF**.



SPECIFICATIONS

INPUT

Input Voltage	120 VAC
Input Frequency	60 Hz
Input Current	3 Amps

OUTPUT

Output Voltage	13.8 VDC ± 0.5 Volts
Output Current	10 Amps DC Continuous
Line Regulation	Less Than $\pm 5\%$
Load Regulation	Less Than $\pm 5\%$
Overload Protection	Fuse 4A/250V
Output Ripple	150 mV RMS

GENERAL

Design	Linear Type
Operating Temperature Range	32–109°F (0–43°C)
Output Terminal	Two Binding Posts 10 Amp
Dimensions (HWD)	4 ³ / ₄ × 7 ³ / ₁₆ × 10 ¹ / ₁₆ Inches (120 × 182 × 256 mm)
Weight	13 lb 14 oz (6.3 kg)

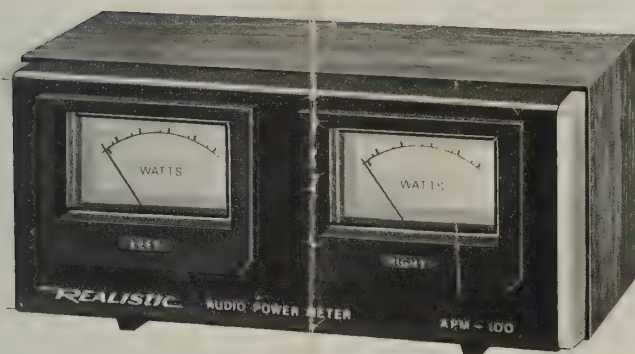
Specifications are typical; individual units might vary. Specifications are subject to change and improvement without notice.

REALISTIC[®]


MODEL APM-100

AUDIO POWER METER

INSTRUCTION MANUAL



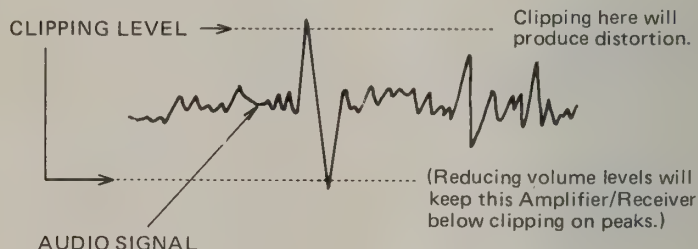
Catalog Number: 42-2100

CUSTOM MANUFACTURED FOR RADIO SHACK  A DIVISION OF TANDY CORPORATION

INTRODUCTION

This sensitive Audio Power Meter is designed to give you a constant indication of the output power of your stereo Amplifier/Receiver — under actual operating conditions. Complex audio signals often require short peaks of high power to accurately reproduce a certain passage. However, often an Amplifier/Receiver can not handle these high peaks and you end up with distortion on the highest peaks of sound. This Audio Power Meter will help you keep track of those peaks of sound (and you'll know if your Amplifier/Receiver can handle those peaks). Of course, you'll also see just how much power is required for average listening levels (you may be amazed at the readings!).

The Audio Power Meter thus not only is an interesting accessory (telling you output power levels), but also can be a most useful accessory in that you will be able to set your system up for output power levels which will permit peak levels without clipping distortion.



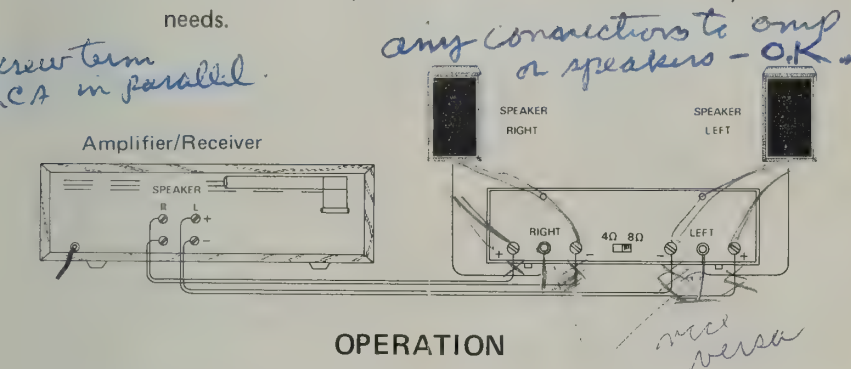
SPECIFICATIONS

RANGE	5 milliwatts to 100 watts (0.005—100W)
METER INDICATION	RMS scale of the Peak-to-Peak value
FREQUENCY RESPONSE	20 to 20,000 Hz
INPUT	Stereo, 4 or 8 ohm impedance

CONNECTION

1. Disconnect power from your Amplifier/Receiver.
2. Disconnect the Speaker wires from the back of your Amplifier/Receiver.
3. Connect the Speaker wires to the screw terminals on the back of the Audio Power Meter; be sure to connect Right channel to Right screw terminals and Left to Left.
4. Connect the Audio Power Meter's Phono jacks to the Speaker's ~~outputs of your Amplifier/Receiver.~~
5. Set the switch on the back of the Audio Power Meter to either 4 or 8 ohms, depending on the impedance of your Speakers (normally this is marked on the back of the speaker).

NOTE: To make the above connections, you may need to purchase extra cables, or cables with plugs on one end and wire leads on the other end — your local Radio Shack store has a complete selection of cables for all your needs.

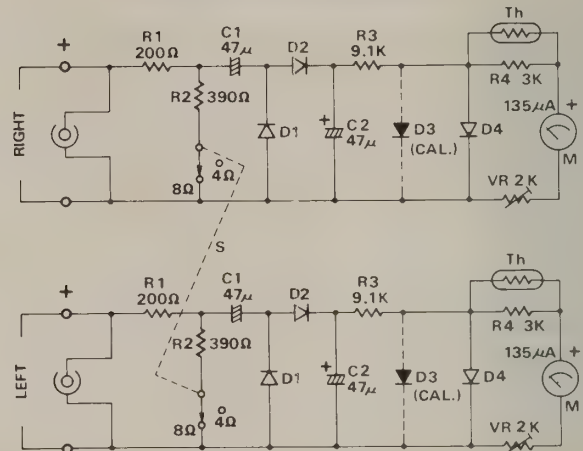


OPERATION

1. Reconnect power to your Amplifier/Receiver. Turn it on.
2. Adjust Volume as desired.
3. Now you can read the actual output power being delivered by the Amplifier/Receiver. If you notice distortion on peaks of music power, your Amplifier/Receiver may be driving into the "clipping" area; if this is the case, you may want to back off on the Volume slightly.

3 8Ω speakers because of higher voltage the signal is shorted to meter.

SCHEMATIC DIAGRAM



RADIO SHACK LIMITED WARRANTY

This equipment is warranted against defects for 90 days from date of purchase. Within this period, we will repair it without charge for parts and labor. Simply **bring your sales slip** as proof of purchase date to any Radio Shack store. Warranty does not cover transportation costs. Nor does it cover equipment subjected to misuse or accidental damage.

This Warranty gives you specific legal rights and you may also have other rights which vary from state to state.

We Service What We Sell

RADIO SHACK  A DIVISION OF TANDY CORPORATION

U.S.A.: FORT WORTH, TEXAS 76102

CANADA: BARRIE, ONTARIO L4M 4W5

TANDY CORPORATION

AUSTRALIA

280-316 VICTORIA ROAD
RYDALMERE, N S W 2116

BELGIUM

PARC INDUSTRIEL DE NANINNE
5140 NANINNE

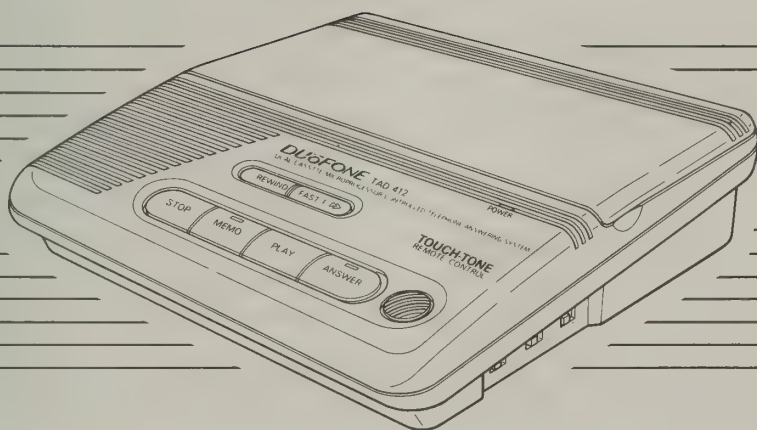
U. K.

BILSTON ROAD, WEDNESBURY
WEST MIDLANDS WS10 7JN

OWNER'S MANUAL

TAD-412 **Dual-Cassette Microprocessor-Controlled** **Telephone Answering System**

Please read before using this equipment



Cat. No. 43-399

DUOFONE®

INTRODUCTION

Your DUÖFONE TAD-412 Dual-Cassette Microprocessor-Controlled Telephone-Answering System makes it easy to record a personal outgoing announcement and easy to receive messages on the incoming-message tape.

The Touch-Tone Remote Control feature of your TAD-412 lets you receive messages and leave memos on your answering machine from any telephone in the world.

This answering machine offers so many special features, we urge you to read this owner's manual completely before using your answering machine.

Some of the features are:

Variable Outgoing-Announcement Lengths—allows your announcement to be whatever length you choose (with the maximum length dependent upon the length of the selected cassette).

Phone Pick-Up Detection—automatically stops the answering machine, if you pick up the telephone while the machine is operating.

Remote Turn-On—allows you to turn on the answer function while you are away from your home or office.

Toll Saver—lets you know whether there are any new messages since your last remote operation without your being charged for a call.

Call Monitor—lets you screen calls when you are at home.

Memo Recording—gives you an electronic bulletin board on which you can leave reminders for yourself or memos for others in the family.

Switchable Maximum Incoming Message Length—sets the maximum incoming message to 30 seconds or 3 minutes.

Erase Rewind—allows you to erase the tape as it rewinds at high speed.

Message Grouping—lets you listen to new messages without having to repeat the old.

For personal records, we recommend that you record the serial number in the space provided below. The serial number is located on the bottom panel of the answering machine.

Serial Number: _____

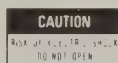
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WARNING: To reduce the risk of fire or electric shock, do not expose this appliance to rain or moisture.



CAUTION: TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT REMOVE COVER (OR BACK). NO USER SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.



The lightning flash with arrowhead symbol within an equilateral triangle is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.



The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

FCC STATEMENT

We have designed your answering machine to conform to federal regulations and you can connect it to most telephone lines. However, each telephone (or other product, such as a telephone answering machine) that you connect to your phone line draws power from the line. We refer to this power draw as the device's *ringer equivalence number* or REN. If you are using more than one product on the line, add up all the RENs. If the total is more than five, your telephones might not ring, and your answering machine might not answer. In some rural areas a total REN of three might impair ringer operation.

Your answering machine complies with Part 68 of *FCC Rules*. You must, upon request, provide the Federal Communications Commission (FCC) registration number and the REN to your telephone company. These numbers are located on the bottom of the answering machine.

Note: You must not connect the answering machine to:

- Coin-operated systems
- Party-line systems
- Most electronic key telephone systems

INSTALLATION

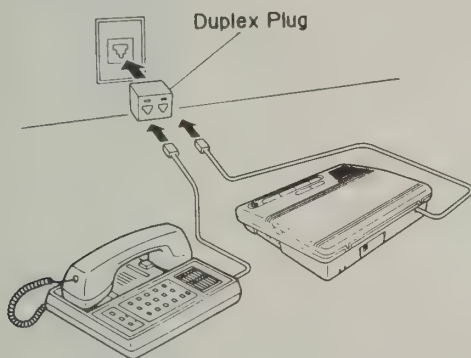
CHOOSING A LOCATION

Choose a location for your answering machine that is:

- Not in the way of normal activities in the area
- Near a telephone jack
- Near an AC outlet

See "Connecting the AC Adapter."

CONNECTING TO THE TELEPHONE LINE



The answering machine comes with a modular plug installed on the end

of the phone cable. Connect the answering machine directly to the phone line by plugging it into a standard modular phone jack.

If you intend to connect both the answering machine and a phone to the same jack, you will need a duplex jack, such as a Radio Shack Cat. No. 279-357.

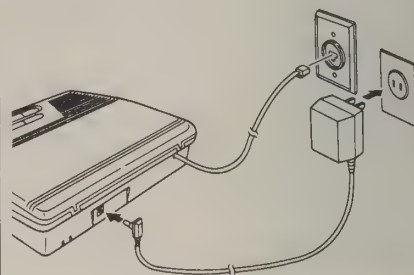
If your telephone line does not end in a modular jack, you can:

- Update the wiring yourself. Radio Shack stores sell jacks and adapters necessary to convert from older wiring methods to modular wiring.
- Have the telephone company update your telephone wiring for you.

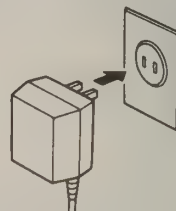
Note: The telephone company has the right to charge you for the jack installation. The telephone company will ask for the USOC number of the jack. This number is RJ-11C.

CONNECTING THE AC ADAPTER

1. Plug the (provided) AC adapter plug into the DC 9V jack, located on the back of the answering machine. (Plugging the adapter into the answering machine before plugging it into the wall outlet prevents damage to the answering machine and the adapter.)

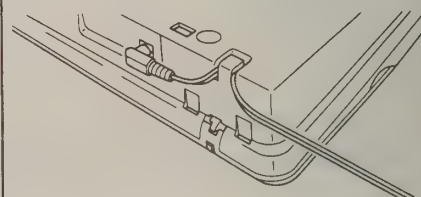


2. Plug the AC adapter into a standard wall outlet.



3. Run the AC adapter cord through the strain-relief slot on the back of the answering machine to prevent the cord from being unplugged accidentally.

Caution: Use only the supplied UL listed adapter with your answering machine. Another type of adapter might damage the answering machine.

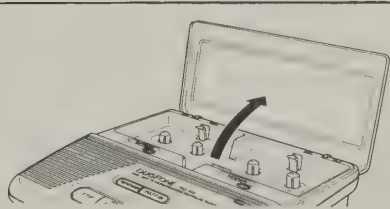


INSTALLING THE TAPES

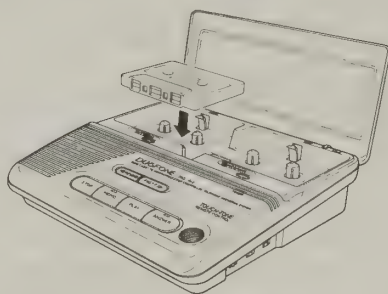
Your answering machine is supplied with two cassette tapes: the SFC-1 (outgoing-announcement) cassette (30-seconds recording per side), and

the SFC-60 (incoming-message) cassette (30-minutes recording per side). Your local Radio Shack store has varying lengths of replacement tapes.

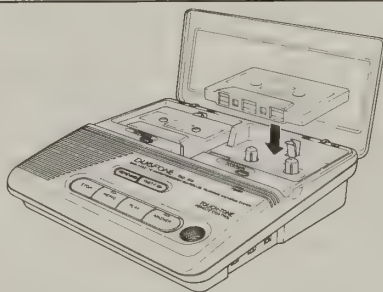
1. Lift open the cassette compartment door.



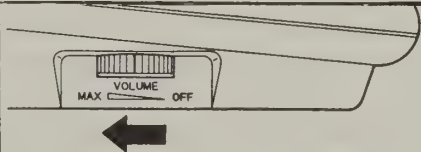
2. Place the SFC-1 (outgoing announcement) cassette in the OUTGOING cassette compartment, with the full reel on the left.
Use only cassettes with leaderless tapes when replacing cassettes. You can find the correct cassette tapes at your local Radio Shack store.



3. Place the SFC-60 (incoming message) cassette in the INCOMING cassette compartment with the full reel on the left.



4. Turn the VOLUME/Power control until it clicks on. The POWER indicator lights.



Notes:

- Replace both tapes at least once a year or more often if used heavily.

- Do not use the SFC-1 cassette in the INCOMING cassette compartment. It is not long enough for more than one message.

OPERATION

COMPOSING YOUR OUTGOING ANNOUNCEMENT

Install the cassette tapes, and then turn on your answering machine. You are ready to record the message you want callers to hear when the machine answers.

Guidelines and Sample Announcements

Before you record your outgoing announcement, we recommend that you write out the announcement you want to use. Here are some guidelines for creating your own announcement.

Always ask for specific information — your caller's name and phone number — so that you can return the call. Do not just tell your callers to leave a message. They were expecting to talk to you and might not be prepared to leave a message; or they might not be comfortable talking to a machine.

Sound cheerful and natural! Be sure your message is not abrupt. Your callers need an explanation of what you want them to do, and then they might require a couple of seconds to think over their response.

For your own protection, do not tell callers that no one is home, because there are dishonest people who might take advantage of your absence. When you record your message, use a phrase like, "We can't get to the phone right now," instead of "We're not home right now."

For example:

"You have reached John Doe's telephone. We are unable to answer the telephone right now. When you hear the tone, please leave your name, phone number, and message, and we will call you back as soon as possible."

"This is the Doe residence. We can't get to the phone right now, but we will be happy to return your call if you will leave your name and telephone number and message. Please speak clearly and directly into the telephone. Thank you."

Composing an Announce-Only Message

Your answering machine has an announce-only mode that lets you make an outgoing announcement stating specific information, but the caller cannot leave a message. This is useful when providing information about an event, for example. Be sure that your message clearly indicates that the caller cannot leave a message.

You can use a tape longer than the SFC-1 provided. You can find leaderless tapes of varying lengths at your local Radio Shack store.

RECORDING YOUR OUTGOING ANNOUNCEMENT

Record your outgoing announcement by following these steps:


1. Be sure that the ANSWER indicator is off. If not, press [STOP].
2. Press [ANNOUNCE RECORD].
The MEMO indicator starts blinking.

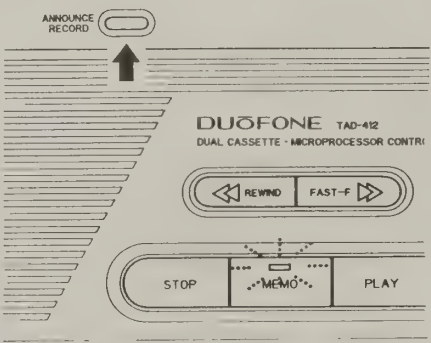
If the outgoing-announcement tape is not at its beginning, the answering machine automatically rewinds the tape to the beginning. The MEMO indicator blinks while the tape is rewinding.

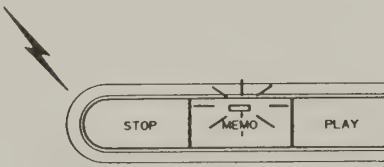
A long tone sounds. Then, the MEMO indicator lights steadily to let you know that you can record your announcement.


Speak clearly and in a normal voice, at a distance of about 8 inches from the microphone.

The recording time for the supplied outgoing-announcement tape is 30 seconds.
- Notes:
 - If you exceed the maximum recording time, the answering machine sounds eight beeps to indicate an error and rewinds to the beginning of the tape. Both the MEMO and ANSWER indicators blink.
 - The VOLUME control has no effect on the recording level. Use it only for playback.



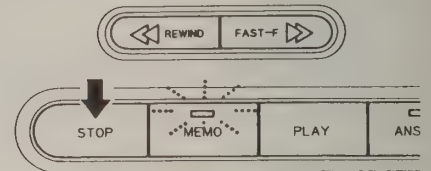






3. After completing your message, press [STOP].

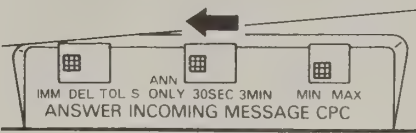
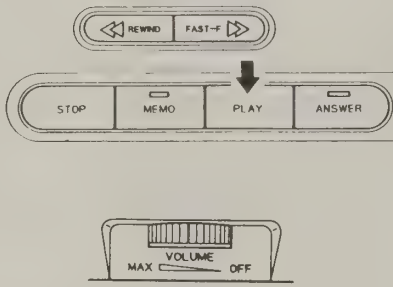

The answering machine automatically rewinds the outgoing-announcement tape to the beginning, and the MEMO indicator blinks during rewind. When the MEMO indicator goes off, you can proceed to other functions.



Notes:

- You can make a library of different messages. Each cassette can handle two messages, one on each side. Additional cassettes are available at your local Radio Shack store. Simply change cassettes when you want to change the message. This way, you do not have to record a new message each time you use the answering machine.
- If there is a 2 second or longer period of silence in your outgoing message, your answering machine assumes that the message is over and proceeds to record the caller's message. To prevent accidentally inserting a long pause in your message, be sure to practice the message before actually recording it.
- If the outgoing-announcement tape is broken, or if you have not installed the outgoing-announcement cassette when you press [ANNOUNCE RECORD], the answering machine sounds eight short beeps to indicate an error.

Checking Your Outgoing Announcement

<p>1. Set the INCOMING MESSAGE switch to ANN ONLY.</p>	 <p>The diagram shows a control panel with three switches. The first switch is labeled 'IMM DEL TOL S ONLY 30SEC 3MIN' and the second is labeled 'ANN'. An arrow points from the first switch to the second, indicating it should be moved to the 'ANN' position. Below the switches, the text 'ANSWER INCOMING MESSAGE CPC' is visible.</p>
<p>2. Press [PLAY].</p> <p>The answering machine checks to be sure the tape is rewind, sounds a few short beeps, and then plays your outgoing announcement through the speaker. Adjust the VOLUME control to a comfortable listening level.</p> <p>At the end of the announcement, the answering machine automatically rewinds the tape to the beginning and stops.</p>	 <p>The diagram shows a control panel with four buttons: 'STOP', 'MEMO', 'PLAY', and 'ANSWER'. An arrow points to the 'PLAY' button. Below the buttons is a volume control slider labeled 'VOLUME' with 'MAX' and 'OFF' markings.</p>
<p>3. Return the INCOMING MESSAGE switch to 30 SEC or 3 MIN.</p>	 <p>The diagram shows the same control panel as in step 1. An arrow points from the 'ANN' switch back to the first switch, indicating it should be moved back to the '30 SEC' or '3 MIN' position.</p>

Caution: If you leave the INCOMING MESSAGE switch at ANN ONLY, a caller cannot leave a message. (See "The INCOMING MESSAGE Switch.")

If you want to change the message, repeat the steps for recording a message. Each time you record, the previous message is erased. You can record over the message as many times as you like.

ANSWERING CALLS

To set your answering machine to answer calls for you, adjust three switches: the ANSWER switch, the INCOMING MESSAGE switch, and the CPC switch.

The ANSWER Switch

This switch determines how quickly your answering machine responds. Before setting your answering machine to answer calls, choose the position you want for the ANSWER switch.

- IMM (Immediate)—Your answering machine answers a call on the first or second ring.
- DEL (Delay)—Your answering machine answers a call after about four or five rings. This gives you a chance to answer the phone before the fourth ring.
- TOL S (Toll Saver)—If the ANSWER switch is set at TOL S, when you call your answering machine from long distance, you can tell in advance whether you have messages:

If there are new messages, the answering machine answers on the first or second ring.

If there are no new messages the answering machine waits four or five rings before answering.

On the third ring you can hang up before the answering machine answers, so that you will not be charged for the call.

The INCOMING MESSAGE Switch

The INCOMING MESSAGE switch has three positions. The 30 SEC and 3 MIN positions determine the length of time the caller has to record a message. The ANN (announce) ONLY position prevents the caller from leaving a message.

- 30 SEC (Seconds)—Caller can record a 30-second message.
- 3 MIN (Minutes)—Caller can record a 3-minute message.

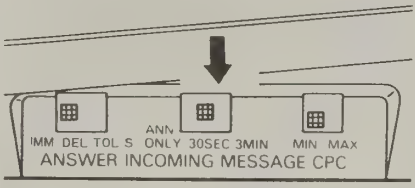
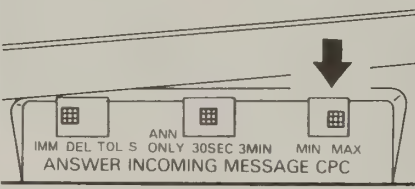
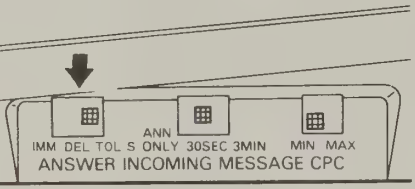
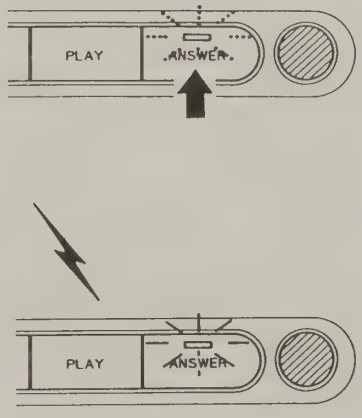
Setting the maximum time does not necessarily waste tape, because if the caller hangs up before using the allotted time, your answering machine automatically stops recording to conserve tape. See "VOX and CPC" for more information.

- ANN ONLY (Announce Only)—When you set the INCOMING MESSAGE switch to ANN ONLY, callers cannot leave a message. Use this position when only an announcement is required, such as a time for a meeting or other event.

The CPC (Calling Party Control) Switch

Set the CPC Switch for the type of Calling Party Control used by your phone system. See "VOX and CPC."

Setting the Answer Mode

1. Set the INCOMING MESSAGE switch to 30 SEC or 3 MIN. Do not leave the switch set to ANN. ONLY.	
2. Set the CPC switch. See "CPC (Calling Party Control)."	
3. Set the ANSWER switch. See "The ANSWER Switch."	
4. Press [ANSWER]. Your recorded announcement rewinds to the beginning. During the rewind, the ANSWER indicator blinks rapidly. At the end of the rewind, a long tone sounds. When the ANSWER indicator lights steadily, your answering machine is ready to answer calls.	

When a call comes in, your answering machine plays the outgoing announcement. Then, as the caller's message is being recorded, the ANSWER indicator blinks rapidly.

After a caller's message is recorded, the ANSWER indicator blinks slowly to let you know that you have received a message.

When there are no new messages the ANSWER indicator continues to light steadily.

Notes:

- If the incoming-message tape becomes full while a caller is talking, you hear eight short beeps. Then, you see on the answering machine, both the MEMO and ANSWER indicators blink.
- If the incoming-message tape is already full when a call comes in, the caller hears only eight short beeps. The caller hears no announcement and cannot leave a message. After about 7 seconds, the answering machine hangs up.
- If the incoming-message tape is already full when you make a remote call to your home or office, you can still operate the answering machine. See "Remote Control Operation".

Using ANNOUNCE ONLY

When you use the announce only function, be sure to state in your outgoing announcement that the caller cannot leave a message. If you did not do this, you might want to redo your outgoing announcement.

1. Set the INCOMING MESSAGE switch to ANN ONLY.
2. Set the CPC and the ANSWER switches. (See "VOX and CPC." and "The Answer Switch.")
3. Press [ANSWER]. Your answering machine is ready to answer calls.

While your answering machine rewinds the outgoing-announcement tape to the beginning, the ANSWER indicator blinks rapidly. When the tape is completely rewound, two beeps sound, and the ANSWER indicator lights steadily to let you know your answering machine is ready to answer calls and to deliver the announce-only message.

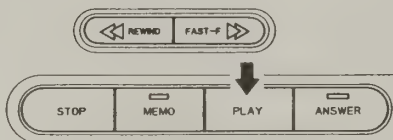
LISTENING TO MESSAGES

The ANSWER indicator blinks slowly to let you know that you have received at least one new message. If there are no new messages, the ANSWER indicator lights steadily.

Before listening to your messages, be sure the INCOMING MESSAGE switch is in either the 30 SEC or the 3 MIN position. (In the ANN ONLY position the outgoing announcement plays.)

1. Press [PLAY].

The incoming-message tape rewinds to the beginning of the new messages. Three beeps sound when rewind is complete. You hear your messages play through the answering machine's speaker.

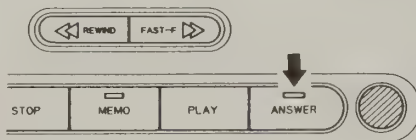


2. Adjust the VOLUME control to a comfortable listening level. A short tone sounds at the end of each message.

At the end of the last message, the tape automatically stops, and three beeps sound. The answering machine enters the stop mode. In the stop mode, your answering machine cannot answer or record calls.



3. To save these messages and to set your answering machine to answer calls again, press [ANSWER]. If you press [REWIND], and then press [ANSWER], new messages record over the old messages. See "ERASING THE INCOMING-MESSAGE TAPE .



PLAYING NEW MESSAGES

Message Grouping

Message grouping saves you from playing the same messages over and over by separating a group of new messages from an old group.

After listening to your messages, if you return to the answer mode without rewinding the tape, the next call records immediately following the last message heard.

If you rewind the tape first, and then return to the answer mode, new messages record over (and erase) previously recorded messages.

To listen to the new messages, press [PLAY]. Your answering machine automatically rewinds to the beginning of the most recent message group and stops. Then, it automatically plays the new messages.

To listen to the new messages a second time, press [REWIND]. The tape rewinds the message group and stops. When the tape stops, press [PLAY].

To review a group of old messages, press [REWIND]. When the tape stops at the end of the first message group, press [REWIND] again. The tape rewinds to the beginning of the tape. Then, you can press [PLAY] to listen to the previously recorded message group.

If you want to listen to a message near the end of the tape, press [FAST-F] to advance the tape rapidly.

REVIEWING PORTIONS OF THE TAPE

1. To listen to an incoming message a second time, while the tape is playing, press [REWIND] or [FAST-F] (fast-forward) to locate the message. You can hear the messages quickly play as your answering machine rapidly rewinds or advances the tape.
2. When you reach the portion of the tape you want to hear, release the [REWIND] or [FAST-F] button. The tape plays at the normal speed.
3. To skip unwanted material such as dial tones, press [REWIND] or [FAST-F]. Release the [REWIND] or [FAST-F] button when you reach the end of the unwanted material and the tape plays at the normal speed.
4. When you are through listening to the messages, press [STOP].

SAVING A MESSAGE

If you want to save a particular message for later reference, press [REWIND] or [FAST-F] to locate the message. Then, let the message play to its end and press [STOP]. Press [ANSWER] to set the answering machine to answer calls.

New messages record immediately following the saved message. When you press [PLAY], your answering machine rewinds back to the beginning of the new messages and plays them.

Notes:

- Remember, some callers might not say anything. If a caller hangs up without leaving a message (or without using the maximum time) and your telephone company does not send out CPC signals, your answering machine will record dial tones, beep tones, or an operator's voice instead of a caller's message until the VOX circuit stops recording. See "VOX and CPC."
- If you do not want to save any messages, press [REWIND]. The tape rewinds to the beginning and new messages will record over the old messages.

- If the incoming-message tape fills up while a caller is talking, the caller hears the answering machine sound eight short beeps and hang up.

On your answering machine, you see both the MEMO and ANSWER indicators blink when there is no more space on the tape. This lets you know that you need to listen to and erase your messages, or that you need to replace the tape.

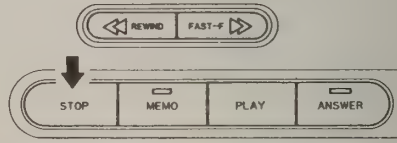
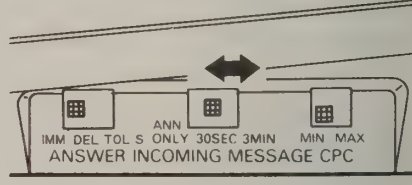
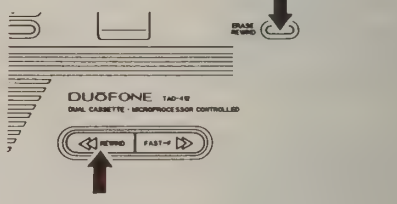
Caution: If for some reason, you remove the incoming-message cassette and then replace it, the message markers are deleted. Because of this, the answering machine cannot tell the difference between new and old messages.

ERASING THE INCOMING-MESSAGE TAPE

Erasing messages is not necessary because old messages automatically erase as new ones record over them. However, if other people have access to your answering machine, there

might be some messages you do not want them to hear.

You can erase the tape using these steps.

<p>1. Before erasing, be sure you have heard all your messages. If the incoming-message tape is still playing, or if the ANSWER indicator is on, press [STOP] so that you can operate the erase function.</p>	
<p>2. Be sure the INCOMING MESSAGE switch is set to 30 SEC or 3 MIN.</p>	
<p>3. Hold down [ERASE REWIND] and press [REWIND].</p>	

The tape erases as it rewinds to the beginning. If you want to stop erasing prior to the beginning of the tape, press [STOP].

Note: If the incoming-message tape is already at the beginning when you press [ERASE REWIND], your answering machine sounds eight beeps to let you know you made an error.

OTHER USEFUL FUNCTIONS

SCREENING CALLS

If you want to monitor your calls before picking up the telephone, set the INCOMING MESSAGE switch to 30 SEC or 3 MIN. Do not leave the switch set to ANN ONLY.

1. Press [ANSWER].
2. Adjust the VOLUME to a comfortable listening level and listen as callers leave messages.

You cannot hear the outgoing announcement when monitoring, but the ANSWER indicator blinking rapidly shows that the outgoing announcement is playing.

3. Pick up the phone if you want to

speak with the person. Your answering machine stops and you can begin a normal conversation. Your answering machine automatically resets to answer future calls.

If you do not want to speak with the person, do not pick up the phone. Your answering machine continues, and the caller can leave a message.

Note: You might want to leave the ANSWER switch set at DEL. This gives you time to answer the phone yourself before the outgoing announcement begins.

RECORDING MEMOS

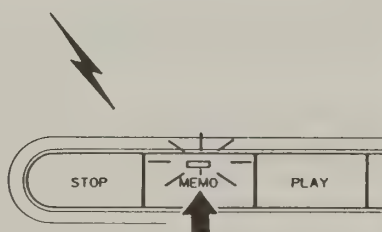
You may leave a memo at any point on the incoming-message tape in place of hand-written notes. If the MEMO indicator is blinking slowly

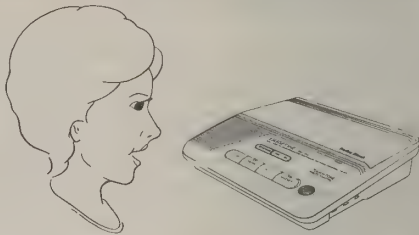
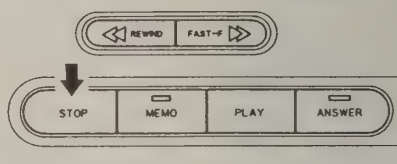
when you return, it tells you that a memo is on your answering machine.

Record a memo following the steps below :

1. Press [MEMO]. This feature works in either the STOP or the ANSWER mode.

Your answering machine sounds a long beep and the MEMO indicator lights steadily to let you know that you can record.



<p>2. Speak into the microphone from a distance of about 8 inches. The recording level automatically adjusts.</p>	
<p>3. When your message is complete, press [STOP]. The MEMO indicator blinks slowly and your answering machine returns to its previous mode (STOP or ANSWER).</p>	

Notes:

- Your answering machine counts the memo recording as a part of the new incoming message group. Follow the procedure under "Listening to Messages" to listen to the memo.
- You will also hear your memos along with your messages when you operate the answering machine by remote control.
- If the incoming-message tape comes to the end during recording, your answering machine automatically stops recording.

USING AN EXTENSION PHONE

You can answer an incoming call at any extension phone that is connected to the same line as the answering machine. Simply pick up the extension phone and carry on a normal conversation. The answering machine stops automatically and enters the answer mode.

If you pick up the telephone about

the same time that the outgoing announcement starts, the announcement might not automatically stop. If this happens, hang up the telephone for a few seconds. Then, pick up the telephone again. This should cause the announcement to stop so that you can converse with the caller.

INDICATOR SUMMARY CHART

Indicator	Status	Indicates that the TAD-412 is:
POWER	Steady	The TAD-412 is turned on and is ready to operate.
ANSWER	Steady	The TAD-412 is ready to receive calls in the ANSWER mode.
	Slow Flash	The TAD-412 has recorded at least one new incoming message. (It is still in the ANSWER mode and ready to receive calls)
	Fast Flash	The TAD-412 is answering a call.
	Off	The TAD-412 is in the other modes than ANSWER.
MEMO	Steady	The TAD-412 is ready to record the outgoing announcement or a memo.
	Slow Flash	The TAD-412 has recorded a new memo.
	Fast Flash	The TAD-412 is rewinding the outgoing tape to the beginning in ANN.RECORD mode.
ANSWER and MEMO	ANSWER-Slow Flash MEMO-Fast Flash	The incoming tape has come to the end during recording an incoming message.
	Both Slow Flash	The TAD-412 has recorded both a new incoming message and a new memo.
	Continuous Three Fast Flashes	<ul style="list-style-type: none"> ● The outgoing tape has come to the end while recording the outgoing announcement. ● The outgoing or incoming tape is torn. ● The microprocessor in the TAD has become "confused" by conflicting instructions. (See "Error Conditions")

VOX AND CPC

VOX (Voice Operated Transmission)

VOX refers to a circuit in your answering machine that continually monitors the caller's voice. If for about 7 seconds, the circuit does not hear anything, your answering machine stops recording, hangs up, and resets. This circuit helps conserve tape when a caller hangs up before the maximum incoming message time (30 seconds or 3 minutes).

However, when a phone is left off-hook, a telephone company recording usually comes on with a loud tone or a reminder to hang up the phone. The recording might come on immediately or after several seconds of no activity on the line.

This variation can be a problem for the VOX circuit. If a caller hangs up as soon as your answering machine answers, your answering machine stays on the line like a telephone that is off-hook. It stays on the line 7 seconds after the message ends, until the VOX circuit stops your answering machine's recorder. If the telephone company recording begins before the VOX circuit stops your answering machine, your answering machine records the telephone company's "hang up" message, because the VOX circuit cannot tell the difference between a recorded message and a caller's voice.

The operation of the "hang up" message from your telephone company might vary greatly from one call to the next.

CPC (Calling Party Control)

When a calling party hangs up, many telephone companies send out a special signal called CPC (calling party control). The CPC signal is a brief interruption of the current flowing in the phone line. This signal can be either long or short and varies from one company to another. When your answering machine detects a CPC signal, it hangs up.

If your telephone company uses a short CPC signal, set the CPC switch to MIN.

If your telephone company uses a long CPC signal, set the CPC switch to MAX.

If you do not know what type of CPC signal your phone company uses, or if they use one at all, begin with the MAX setting. If your TAD does not disconnect when a caller hangs up and often records telephone company messages, try the MIN setting. Use the setting that results in the most efficient operation.

Note: Telephone companies that use the long CPC signal, or no CPC signal, might use a short signal for the call-waiting feature. If you have call-waiting and use the MIN setting, the answering machine will hang up when a second call comes

in while someone is leaving a message.

If you have problems when using MIN setting, your telephone company is not sending a CPC signal. Set the CPC switch to MAX and set the INCOMING MESSAGE switch to 30 seconds. This limits the time the caller has to leave a message, but shortens the amount of tape wasted when a caller hangs up in less than 30 seconds. If you have call waiting, set the switch to MAX.

REMOTE CONTROL OPERATION

You can control your answering machine from any touch-tone telephone without any additional equipment. You can also control it from a rotary-dial phone with a pocket tone dialer (available at Radio Shack).

You must use a security code to operate the answering machine when you are away from your home or office. This prevents unauthorized persons from controlling your answering machine. See "Setting the Security Code."

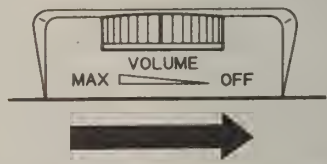
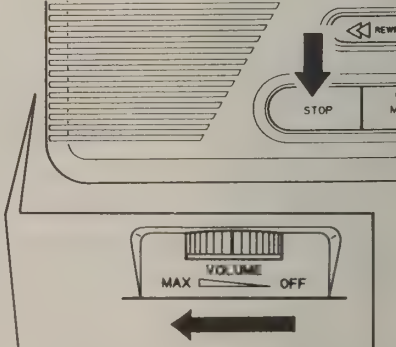
If the code is correct, your answering machine accepts your remote commands. If it is not correct, your answering machine continues its normal answering functions, but does not respond to remote commands.

Note: The remote control might not work if you use a telephone that sounds a short touch-tone or if you use a dialer that does not emit a steady tone signal. If you have trouble, try calling from another phone or using another pocket-tone dialer.

SETTING THE SECURITY CODE

The default code that activates your answering machine by remote control (when you have not entered your personal security code), is 11. For

your peace of mind, however, we recommend that you select your own 2-digit security code, by following these steps:

1. Turn the VOLUME/Power control to OFF. The power indicator goes off.	
2. Press and hold [STOP]. While holding [STOP], turn the answering machine on. The power indicator lights and a long tone sounds.	

3. Within 7 seconds after the tone, enter a two-digit code from numbers assigned to your answering-machine controls as follows:

[REWIND] = 1

[FAST-F] = 2

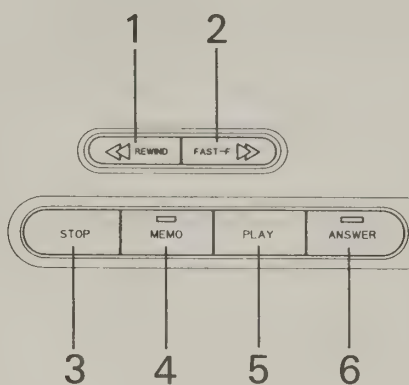
[STOP] = 3

[MEMO] = 4

[PLAY] = 5

[ANSWER] = 6

The two digits chosen from these six controls are entered by the answering machine for your security code. (You can dial these numbers on a telephone away from your home or office, and the answering machine will respond to the touch tones generated by the telephone.)



Note: If you do not enter the code within 7 seconds of the long tone sound, you hear eight short beeps to indicate an error. If you hear these beeps, start over from Step 1.

For example, to enter 15 as the security code:

- Within the 7-second interval after the long tone sounds, press [REWIND]. A short tone sounds.
- Then, press [PLAY] immediately.

Once you press the second digit of the security code another long tone sounds to indicate that you have successfully completed the code.

CHANGING YOUR SECURITY CODE

You can change the code by repeating the three-step procedure immediately below "Setting the Security Code."

USING THE REMOTE CONTROL

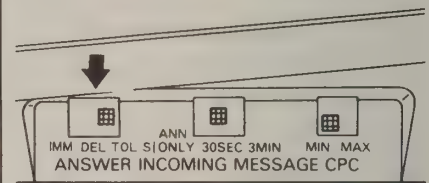
When you dial numbers on a telephone away from your home or office, your answering machine responds to your security-code numbers. (See "Setting the Security Code.")

It also responds to the following remote-control commands:

- [*] Activates remote
- [1] Activates rewind
- [2] Activates play

1. Dial your phone number. If the ANSWER switch is set at TOL S, and no new messages have been recorded since the last time you called, the answering machine waits four or five rings before it answers. Then, the outgoing message plays.

If the ANSWER switch is set at TOL S and it has received new messages, the answering machine answers on the first or second ring, and the outgoing announcement plays.



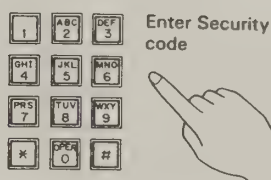
2. While the outgoing-announcement is playing, press and hold [*] for about 2 seconds. The outgoing-announcement pauses.



3. Enter your 2-digit security code within 7 seconds after the announcement pauses.

If you enter an incorrect security code, the answering machine continues to play the outgoing announcement. Press [*] again and enter the correct code.

If the code is correct and the answering machine has received a new message, the incoming-message tape automatically rewinds to the beginning of the new message (or block of messages). Then, the messages automatically play back.



After playing the messages, your answering machine stops and sounds three short beeps. It waits 7 seconds for the next remote command. Press [1] or [2] if you want to review messages, (see "Reviewing Messages".) If you want to finish the remote control operation, hang up your telephone. The answering machine automatically returns to the answer mode. If your answering machine does not receive any commands, after 7 seconds it hangs up. When you hang up, it also save the messages and returns to the answer mode.

Reviewing Messages

1. Press [1] for rewind. The incoming-message tape rewinds to the beginning of the most recently recorded message group. While messages are rewinding, you hear intermittent beeps. At the beginning of the new message group you hear three short beeps.

If you want to replay previously recorded messages, press [1] again. The messages rewind to the beginning of the tape. You will hear intermittent beeps until the tape reaches the beginning of the tape. Then, all beeps stop sounding.

-
- 2 Press [2] for play. The messages play. At the end of the message group you hear three short beeps. To listen to the second message group, press [2] again.

Notes:

- If you enter an incorrect security code more than three times, your answering machine does not respond to any further attempts. Hang up and call again.

After the security code is entered and the answering machine is playing the messages, if you hear three short beeps, you have reached the end of a message group. There is still space on the tape to record more new messages.

- If you hang up the telephone before the incoming messages have finished playing, the messages play to the end. Then, your answering machine returns to the answer mode. None of the messages are lost.

- If you do not need to save your messages, press [1] for rewind. The answering machine rewinds the tape to the beginning of the new message group. Do not press [2] for play. This way, the new messages will record over (and erase) the old messages.
- When you press [1] for rewind, if you hear eight short beeps, you have reached the beginning of the tape. It cannot rewind further. It is in position, however, to play back or to answer and record messages.
- If your answering machine has received no new messages, it sounds three short beeps and waits 7 seconds for the next remote command.

USING A POCKET TONE DIALER

The tones from a tone dialer must pass through the microphone of the remote telephone to get to your answering machine. Some of these microphones are old and do not reproduce the tones accurately, causing erratic operation. The tips below might help you overcome this problem.

- Hold the handset in a vertical position.
- Be sure the dialer's speaker is centered over the mouthpiece.



If you continue to have problems, gently tap the handset on a hard surface. This might make an older phone work better.



REMOTE TURN ON

You can put your answering machine in the answer mode while you are away from your home or office, provided:

- a. The POWER control is turned on.
 - b. The answering machine is in the stop mode.
 - c. Both cassettes are installed.
1. Call your telephone number and let it ring for about 75 seconds. Your answering machine answers your call.
 2. When it begins playing the outgoing message, hang up the phone.

Your answering machine rewinds the outgoing announcement and enters the answer mode, and is ready to receive calls.

If you wish, you can leave a memo before hanging up the phone. You might want to state the time you turned on the answer function.

ERROR CONDITIONS

SYMPTOM	SOLUTION
Eight short beeps sound:	
When you press [ANNOUNCE RECORD].	(Outgoing-announcement tape is missing.) Install tape.
When you press [ANSWER], [PLAY], [REWIND], [FAST-F], [ERASE REWIND], or [MEMO].	(Incoming-message tape is missing.) Install tape.
When you press [REWIND], [FAST-F], or [ERASE REWIND].	(INCOMING MESSAGE switch is set to ANN. ONLY.) Set to correct position.
When you press [ERASE REWIND] or [REWIND].	(Incoming-message tape is at the beginning.) Press [PLAY] or [FAST-F].
Eight short beeps sound and the ANSWER and MEMO indicators flash.	(Incoming-message tape ends before caller completes recording.) Replace tape.
	(Outgoing-announcement tape ends and rewinds before recording is complete.) Replace tape with one of correct length.
	(One or both tapes are torn.) Replace tape.
ANSWER and MEMO indicators blink after problem is corrected.	(Possible internal circuitry or tape mechanism error.) 1. Press [STOP], 2. Turn the VOLUME/Power control off, then back on. 3. Disconnect, then reconnect the adapter.
Eight short beeps sound when security code is being entered.	(Code was not entered within the required 7 seconds.) Reenter following the correct steps within the allotted 7 seconds.
Eight short beeps sound when you attempt remote control operation.	(You are at the end of the incoming-message tape. The tape is full.) To hear the message, enter your security code within 7 seconds of the beeps. The new message group automatically rewinds and plays back.

CARE AND MAINTENANCE

Your TAD-412 is an example of superior design and craftsmanship. The following suggestions will help you care for the product so that you can enjoy it for years.



Keep your TAD dry. If it does get wet, wipe it off immediately. Liquids might contain minerals that can corrode the electronic circuits.



Use and store your TAD only in normal temperature environments. High temperatures can shorten the life of electronic devices, and distort or melt plastic parts.



Handle your TAD gently and carefully. Dropping it can damage circuit boards and can cause the product to work improperly.



Keep your TAD away from dust and dirt. These can cause premature wear of parts.



Wipe your TAD with a dampened cloth occasionally to keep it looking new. Do not use harsh chemicals, cleaning solvents, or strong detergents.

Modifying or tampering with your TAD's internal components can cause a malfunction and might invalidate your warranty. If the product does not perform as it should, take it to your local Radio Shack store.

CLEANING THE TAPE HEADS

Inspect and clean the tape heads on a regular basis. A swab or tape-head cleaning kit is useful for this purpose. Press [STOP] and remove both cassettes. A swab dipped in tape head cleaning solution can then be gently

applied to the tape heads. Never use any chemical not approved for tape head cleaning and never touch the head surface with your fingers or with any sharp metal object.

IN CASE OF A POWER FAILURE

During an AC power failure, the answering machine functions do not work. If power is off longer than 12 hours, the answering machine loses its function information. It will then enter the stop mode when power is restored. The answer mode is cancelled.

But if the failure lasts less than 12 hours it will return to normal operation. Your answering machine retains the following information to assure normal operation when power is restored:

- If your answering machine is set to the answer mode, it returns to the answer mode when power is restored.
- If your answering machine had incoming messages prior to the interruption, the ANSWER indicator starts blinking slowly when power is restored.
- If your answering machine had old and new messages, it retains the separate grouping.

THE FCC WANTS YOU TO KNOW

It is very unlikely, but if your answering machine causes problems on the phone line, the telephone company can discontinue your service temporarily. If this happens, the telephone company notifies you and gives you a chance to correct the problem.

Also, the telephone company can change its lines and/or equipment. If these changes affect your telephone or its connection, the telephone company notifies you in writing so that you can take steps to ensure uninterrupted service.

LIGHTNING

Your answering machine has built-in protection circuits. These circuits meet or exceed FCC requirements to reduce the risk of damage from surges in the telephone line current or the AC power line. Lightning striking near, or directly on, these lines might cause an excessive surge of voltage that can damage the answering machine.

Lightning damages is not common. However, if this concerns you, or if you live in an area with frequent or severe electrical storms, we suggest that you unplug your electronic equipment during the storms.

PROBLEM SOLVING

PROBLEM	SOLUTION
The answering machine records a dial tone, beeping, siren , or an operator's recorded voice instead of a caller's message.	Move the CPC switch to MIN.
The caller hangs up without leaving a message or without using the maximum message time and your telephone line does not receive CPC signals.	Set the INCOMING MESSAGE switch to 30 seconds and the CPC switch to MAX. This minimizes the amount of wasted tape.
Your answering machine does not answer the telephone.	Bad phone line connection. VOLUME/Power control is set to OFF. Turn power ON. Your answering machine is not set to ANSWER or ANN ONLY. Adjust the INCOMING MESSAGE switch and press ANSWER button. One of the message tapes is not in stalled properly. Adjust the tape.
The outgoing announcement does not play.	Outgoing-announcement cassette is not installed properly. Adjust it. The cassette is broken. Replace it.
The outgoing announcement is distorted.	You were too close to the microphone or you spoke too loudly when you made the recording. Redo the announcement.
The outgoing or incoming message is distorted.	Recording heads are dirty. Clean them. Heads need to be demagnetized. Demagnetize record/play heads. Tapes are worn out. Replace them with new tapes. (Replace tapes at least once a year).
The incoming-message tape does not move.	The INCOMING MESSAGE switch is set to ANN ONLY. Set it to 30 SEC or 3 MIN position.

PROBLEM	SOLUTION
The [ERASE REWIND], [REWIND], or [FAST-F] controls do not work.	The INCOMING MESSAGE switch is set to ANN ONLY and the incoming-message tape does not move. Set the switch to 30 SEC or 3 MIN position.
The MEMO indicator is flashing rapidly and the ANSWER indicator is flashing slowly.	The incoming-message tape was full when a call came in, or the tape became full when a caller was leaving a message. Replace or rewind cassette after listening to messages.
The MEMO and ANSWER indicators are blinking slowly.	The answering machine received an incoming message and a memo message. Listen to your messages.
Both MEMO and ANSWER indicators blink continually.	You exceeded the maximum outgoing announcement recording time. Try again to record the message within the allotted time.
Eight beeps sound when you press any of the controls except [STOP].	Torn tape, or tape is missing. Replace the tape.
The incoming message comes to an end during remote playback. The answering machine sounds eight beeps and stops.	You have 7 seconds in which you can enter your security code so that you can review your messages using [1] for rewind and [2] for play.

If you still have problems, disconnect the telephone cord immediately. If other phones on the same line function properly, the problem is in your answering machine or its in-

stallation. If you are unable to locate the problem, bring the answering machine to your local Radio Shack store.

SPECIFICATIONS

General

Power Requirement	AC 120V/DC 9V
Power Consumption	5 or 6 watts
Dimensions	2-7/64" x 8-63/64" x 7-11/16" (H x W x D) (53.5 x 228 x 195 mm)
Weight	2 lb (920 g)

Tape Recorder

Tape Speed	4.75 cm/sec.
Wow & Flutter	0.3 %
Incoming Rewind Time (SFC-60)	120 seconds
S/N Ratio	30 dB Incoming and Outgoing
Frequency Response	-4 dB at 500 Hz and -3 dB at 3 kHz (1 kHz reference)
Distortion	4 %
Erasing Ratio	40 dB
Recorder Sensitivity	-13 dBm (Rec/Play at 1 kHz)

Answering Machine

Number of Rings before Answering	1 or 5 (approximately)
Maximum incoming Message Time	30 seconds or 3 minutes
VOX Operation Time without Sound	7 seconds
CPC Detection Time	6 ms (MIN)/ 350 ms (MAX)
CPC Invalid Time at Beginning of Outgoing Message	2 seconds

Operating Parameters

This information is supplied to assist you in answering possible technical questions from your telephone company.

Interface	Loop start
Ringer	Standard bridged ring 15.3 - 68 Hz sine or square wave 40 - 105 volts ring signal
Current	20 - 130 mA DC (off hook)
Resistance	More than 10 Mohm (on hook)/ 270 ohm (off hook)

RADIO SHACK LIMITED WARRANTY

This telephone product is warranted against manufacturing defects in material and workmanship for one (1) year from the date of purchase from Radio Shack company owned stores and authorized Radio Shack franchisees and dealers. Within this period Radio Shack will repair the telephone product without charge for parts and labor. Simply **bring your Radio Shack sales slip** as proof-of-purchase date to any Radio Shack store.

This warranty does not cover damage or failure caused by or attributable to Acts of God, abuse, misuse, improper or abnormal usage, faulty installation, improper maintenance, lightning or other incidence of excess voltage, or any repairs other than those provided by a Radio Shack Authorized Service Facility, or transportation costs.

Radio Shack is not responsible or liable for indirect, special, or consequential damages arising out of or in connection with the use or performance of the product or other damages with respect to loss of property, loss of revenues or profit, or costs of removal, installation or reinstallation.

EXCEPT AS PROVIDED HEREIN, RADIO SHACK MAKES NO EXPRESS WARRANTIES, AND ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE IS LIMITED IN ITS DURATION TO THE DURATION OF THE WRITTEN LIMITED WARRANTIES SET FORTH HEREIN. Some states do not allow the limitation or exclusion of incidental or consequential damages and some states do not allow limitation or exclusion of implied warranties; therefore, the aforesaid limitation(s) or exclusion(s) may not apply to the purchaser.

There will be charges rendered for repairs to the product made after the expiration of the aforesaid one (1) year warranty period.

This warranty gives you specific legal rights and you may also have other rights which vary from state to state.

We Service What We Sell

3/87

RADIO SHACK
A Division of Tandy Corporation
Fort Worth, Texas 76102

12A9

Printed in Hong Kong
811022220B

5-Band Solid State Communications Receiver



DX-160

**OWNER'S
MANUAL**

**PLEASE READ BEFORE
USING THIS EQUIPMENT**

REALISTIC

**CAT. NO.
20-152**

CUSTOM MANUFACTURED FOR RADIO SHACK  A DIVISION OF TANDY CORPORATION

- Long Wave to Short Wave Puts the World at Your Fingertips!
- Tune In On Broadcasts From Far Off Places!
- Hear Live Action Drama as It Actually Happens!
- Be Able to Tune in all Types of Communications—SSB/AM/CW-Amateur, CB, International, Government.....

...It All Comes to Life on Your Realistic DX-160 Communications Receiver

Today's busy airwaves are literally full of programs of entertainment and educational value. A good portion of international programming is transmitted in English from such distant cities as London, Tokyo, Paris, Rome, Berlin and Moscow.

Many fascinating and important events occur every day on the long wave and short wave radio bands. You may hear the captain of a fishing vessel radioing news of his catch... or the Coast Guard instituting rescue operations to aid a ship in distress. The armed services constantly use short wave frequencies to communicate between aircraft, land bases and ships at sea. Radio Amateurs provide a wealth of technical information during their contacts with one another throughout the world.

The short wave bands encompass many, many interesting services, providing thousands of listeners with an absorbing new hobby. There is activity on these bands, day and night, every day, every week of the year.

This booklet has been prepared to help you discover for yourself what a fascinating and wonderful world short wave really is. Happy Hunting on the airwaves!

RADIO SHACK LIMITED WARRANTY

This equipment is warranted against defects for 1 year from date of purchase. Within this period we will repair it without charge for parts and labor. Simply bring your sales slip as proof of purchase date to any Radio Shack Store. Warranty does not cover transportation costs. Also, this equipment is not subjected to abuse or accidental damage.

This Warranty does not apply to accessories and optional equipment. The right to modify or change specifications is reserved.

We Service What We Sell

SPECIFICATIONS

FREQUENCY COVERAGE:

Band A = 150 to 400 kHz
(.15-.4 MHz)
Band B = 535 to 1600 kHz
(.535-1.6 MHz)
Band C = 1.55 to 4.5 MHz
Band D = 4.5 to 13 MHz
Band E = 13 to 30 MHz

SENSITIVITY (10 dB S+N/N at approx. center of band):

Band A = 50 μ v
Band B = 100 μ v
Band C = 3 μ v
Band D = 4 μ v
Band E = 4 μ v

SELECTIVITY:

4 kHz at -6 dB
18 kHz at -40 dB

IMAGE RESPONSE (at approx. center of band):

Band A = -48 dB
Band B = -65 dB
Band C = -45 dB
Band D = -35 dB
Band E = -20 dB

FREQUENCY RESPONSE: 300 to 3000 Hz, -6 dB

AUDIO OUTPUT:

700 milliwatts at less than 10% distortion

SPEAKER/HEADPHONE IMPEDANCE:

8 ohms

SEMICONDUCTOR COMPLEMENT:

1 Integrated Circuit
5 Field Effect Transistors (FET's)
6 Transistors
15 Diodes

POWER REQUIREMENTS:

AC: 120 volts, 60 Hz, 3-6 watts
DC: 12 volts, negative ground,
30-180 mA

For your own protection, we urge you to record the Serial Number of this unit in the space provided. You'll find the Serial Number on the back panel of the unit.

Serial Number

4484

HISTORY OF SHORT WAVE RADIO

The development of short wave radio involved such famous personalities as Hertz, Maxwell, Marconi, DeForest, Armstrong and many others. Each made significant contributions to the growth of radio and short wave... Maxwell developed new mathematical formulae; Hertz transmitted the first radio signals; DeForest invented the vacuum tube; Armstrong conceived and developed such radio circuitry as the superheterodyne and the FM receivers. Marconi, of course, transmitted the first transatlantic radio signal from England to Canada.

Marconi's feat was the more amazing because it was generally assumed the radio signals, like light rays, travelled in straight lines. It was thought that radio waves would shoot off into space—that they were incapable of curving around the earth.

Further transatlantic tests indicated an increase in distance from day to night operation. Two theorists—Kennely and Heaviside—working independently of one another, conceived the idea of an electrical region high in the earth's atmosphere that acted like a mirror on radio waves. Instead of heading into space, radio-wave energy was reflected back to earth where it could be received by a distant station. In tribute to the accuracy of the concept, the region was designated the Kennely-Heaviside Layer. Today it is more commonly called the ionosphere. The special behavior of this electrified region is largely responsible for international reception activity in the short wave radio bands.

"Ham" Operators also have contributed greatly to the development of short wave listening. Radio amateurs have been communicating across the "Pond" (the ocean) since the early 1920's on all the short wave bands available to them.

HOW SHORT WAVE WORKS

A short wave radio signal is an invisible field of energy which travels at the speed of light (186,000 miles per second (300,000km/sec) as it carries a signal from the antenna of a station to the

The electrical forces which produce a radio wave originate in the transmitter portion of the sending station. Electrical currents are made to surge back and forth at extremely high speeds. As these

currents progress through the various stages in the transmitter, they are amplified and boosted in power. This radio frequency power is then applied to the transmitting antenna thus generating the actual radio wave... the field of electrical energy which travels outward from the antenna. As described earlier, this wave travels upward toward outer space with some of the wave's energy reflected off the ionosphere and back to earth to a distant receiving station. See Figure 1.

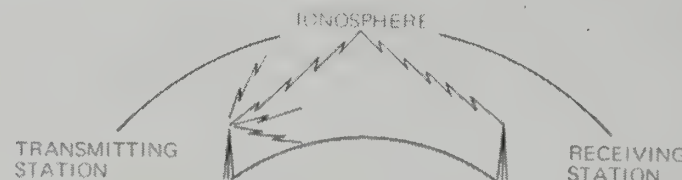


Figure 1

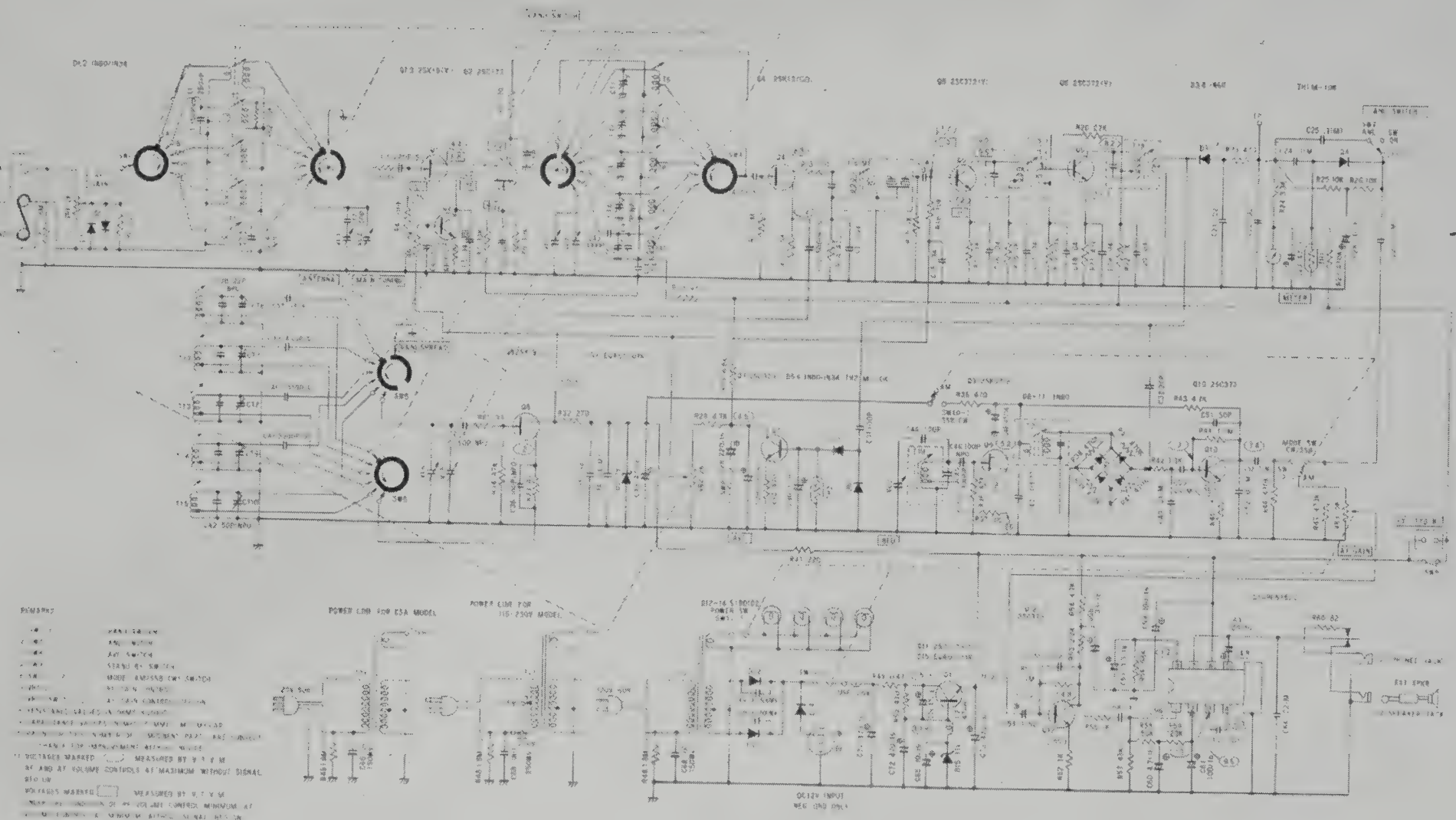
At different periods of the year, short-wave reception improves above the usual value between the receiving site and various areas in the world. As an example—the spring months bring the strongest signals from Australia and the South Pacific. In the fall months, signals from Europe and the Far East dominate the bands. Also, as daylight changes into darkness each day between your receiving location and the transmitting station, so does the nature of the reception. Day-to-day variations are also present. Further, the sunspot cycle greatly affects the overall reception quality. Sunspot activity varies in an 11-year cycle. The last peak activity was about 1968; minimum activity will be about 1976. Maximum activity = best DX reception; minimum activity = inconsistent and/or poor DX reception. Thus, reception will vary from year to year.

WHAT TO LISTEN FOR

The Short Wave frequencies are your passport to a world of exciting adventure—

AMATEUR RADIO Amateur (Ham) radio stations are operated by private citizens in more than 250 countries around the world. See **Band Spread and Dial Calibration**, also **Notes on Operating on Each Band**.

SCHEMATIC DIAGRAM



Cat. No. 32-2035

OWNER'S MANUAL

Please read before using this equipment

MPA-45

35-Watt PA Amplifier

REALISTIC[®]

FEATURES

Your new Realistic MPA-45 PA Amplifier gives you 35 watts of solid power for your PA System. Its wide frequency response makes it suitable for music and voice. Use it in meeting halls and auditoriums, at sports events, in schools, in the office for paging systems — anywhere you need special announcements or great sound.

Read this manual carefully. It describes various speaker connections to help you select the best arrangement for your system.

Your amplifier also includes the following features:

Two Microphone Input Jacks — let you connect two microphones.

PHONO and AUX Input — let you connect a phonograph and a tape recorder or receiver for music and special effects.

Priority Terminals — let the Microphone 1 output override all other inputs.

MASTER VOLUME Control — lets you adjust the overall sound level.

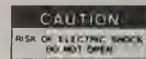
Frequency Equalizer — lets you control the sound level of three separate frequency ranges.

70-Volt Line Output—lets you connect line transformers for a multiple-speaker PA system.

For your permanent records, we suggest you record the amplifier's serial number in the space below. The serial number is on the amplifier's back panel.

Serial Number _____

WARNING: To reduce the risk of fire or electric shock, do not expose this appliance to rain or moisture.



CAUTION: TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT REMOVE COVER (OR BACK). NO USER SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.



The lightning flash with arrowhead symbol within an equilateral triangle is intended to alert the user to the presence of uninsulated dangerous voltage within the product's enclosure.



The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

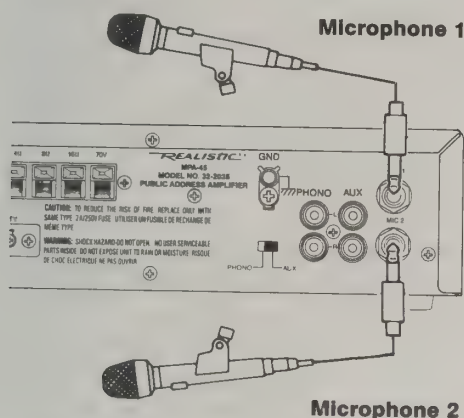
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CONNECTIONS

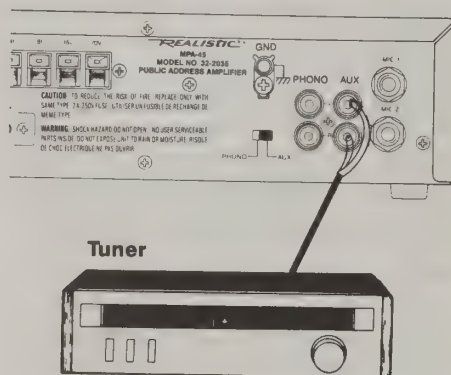
CONNECTING MICROPHONES

Use the MIC 1 and MIC 2 jacks to connect one or two microphones to the amplifier. The microphone(s) can be high- or low-impedance and must have a 1/4-inch plug.



CONNECTING AN AUXILIARY SOUND SOURCE

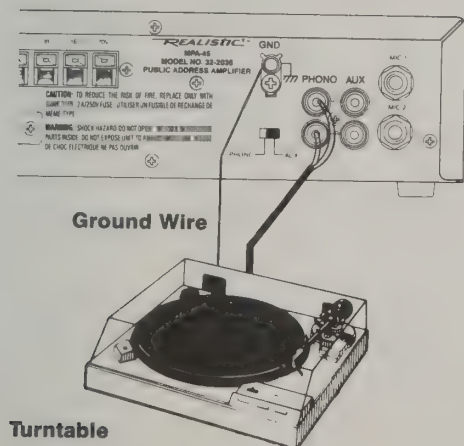
Connect an auxiliary sound source, such as a tape deck or a tuner, to the amplifier's L and R AUX jacks.



CONNECTING A TURNTABLE

Connect a turntable to the amplifier's L and R PHONO jacks.

Connect your turntable's ground wire (usually black or green) to the amplifier's GND screw to void hum.



CONNECTING POWER

You can power your amplifier from standard household AC power. To connect the amplifier to power, plug the supplied AC cord into any standard outlet.

Your amplifier's fuse (located on the amplifier's back panel) protects your amplifier from voltage surges. If the power indicator does not light when you press POWER, check the fuse. If the fuse is blown, replace it with the supplied spare fuse or an identical 2-amp, 250-volt fuse. Be sure you unplug the power cord before you replace the fuse.

To replace the amplifier's fuse, use a Phillips screwdriver to unscrew the fuse holder. Then, remove the fuse holder, replace the fuse, and replace the fuse holder.

CONNECTING SPEAKERS

For the best results, use speakers that are rated at 4 to 16 ohms. For speaker connections, use 18-gauge speaker wire for lengths up to 25 feet. Use 16-gauge wire for lengths over 25 feet. We recommend that you use the shortest length of wire possible.

To prepare the speaker wire, remove about 1 inch of insulation from the end of the speaker wire you intend to connect to the amplifier. Then, twist the exposed wire to secure all of the wire strands.

To connect speaker wire to the amplifier, press down the appropriate push terminal lever on the amplifier and insert the end of the wire into the terminal's hole. Then, release the lever to secure the wire.

You can connect two or more speakers with or without transformers.

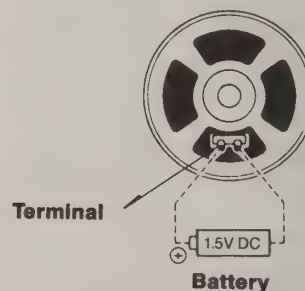
DETERMINING SPEAKER POLARITY

Most speaker terminals are color-coded or have a mark that indicates the terminal's polarity. Usually, terminals with positive polarity are red or have a plus symbol (+), and terminals with negative polarity are black or have a minus symbol (-). If your speakers' terminals do not indicate their polarity, you must determine the polarity yourself to ensure that the speakers are properly phased.

Proper phasing is important when you use more than one speaker in the same room or area. Speakers are in-phase when their cones move in the same direction when an equal signal is applied to the speakers. Connecting speakers out of phase can reduce the speakers' overall response.

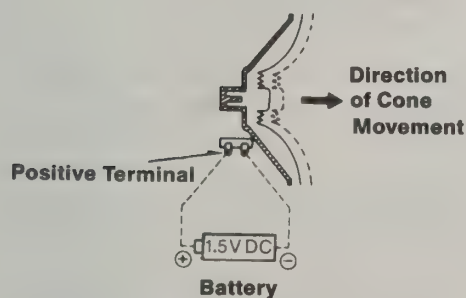
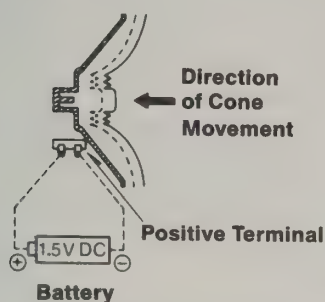
Follow these steps to determine the polarity of the speaker terminals.

1. Connect one end of a 1.5-volt flashlight battery to one of the speaker terminals.



2. Briefly touch the opposite end of the battery with the other speaker terminal. The speaker cone moves in or out.

If the cone moves in, the terminal connected to the battery's negative side is positive.

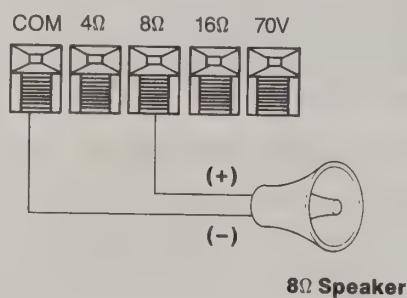


Mark the positive terminal with a plus (+) sign.

3. Repeat Steps 1 and 2 for each speaker.

CONNECTING ONE SPEAKER

Connect the speaker's negative (-) terminal to the amplifier's COM terminal. Then, connect the speaker's positive (+) terminal to the terminal that matches the impedance of the speaker. The following example shows an 8 Ω speaker connected to the amplifier's 8 Ω terminal.



Note: We recommend 18-gauge speaker wire if the length of wire is 25 feet or shorter. If the length of wire is longer than 25 feet, use 16-gauge wire. For the best results, we suggest you use the shortest length of speaker wire possible.

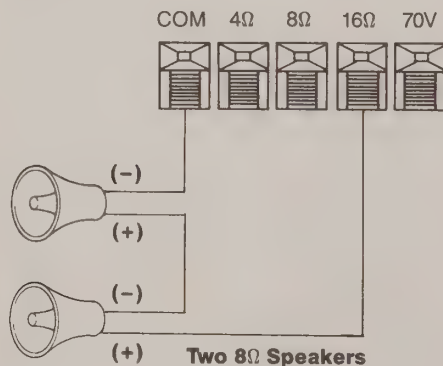
CONNECTING SPEAKERS WITHOUT TRANSFORMERS

If you connect speakers without transformers, the lengths of speaker wire should be no longer than 50 feet. For lengths up to 25 feet, use 18-gauge wire; for lengths from 25 to 50 feet, use 16-gauge wire. To ensure equal volume from each speaker, all the connected speakers should have the same impedance rating. The following examples show 8Ω speakers, which are the most common type sold by your local Radio Shack store.

Connecting Speakers in Series

Before you connect speakers in series, determine the total impedance for the speakers. To do so, add the impedance of all connected speakers. For example, if you connect two 8-ohm speakers, add 8 (impedance of one speaker) plus 8 (impedance of the other speaker) for a total impedance of 16 ohms. The total impedance should match one of the amplifier's terminals (4Ω, 8Ω, or 16Ω).

Caution: The total impedance must be at least 4 ohms but must not exceed 16 ohms.



Connecting Speakers in Parallel

Before you connect speakers in parallel, determine the total impedance. To do so, divide the impedance of one speaker by the number of speakers. For example, if you connect two 8-ohm speakers, divide 8 (impedance of speakers) for a total impedance of 4 ohms. The total impedance should match one of the amplifier's terminals (4Ω, 8Ω, or 16Ω).

Caution: The total impedance must be at least 4 ohms but must not exceed 16 ohms.

Combining Series and Parallel Connections

If you connect more than two speakers using only series or only parallel connections, the total impedance might exceed the amplifier's maximum impedance (16 ohms) or fall below its minimum impedance (4 ohms).

For example, if you connect four 8-ohm speakers in series, the total impedance is 32 ohms ($8+8+8+8=32$). Or, if you connect four 8-ohm speakers in parallel, the total impedance is 2 ohms (8 divided by $4=2$).

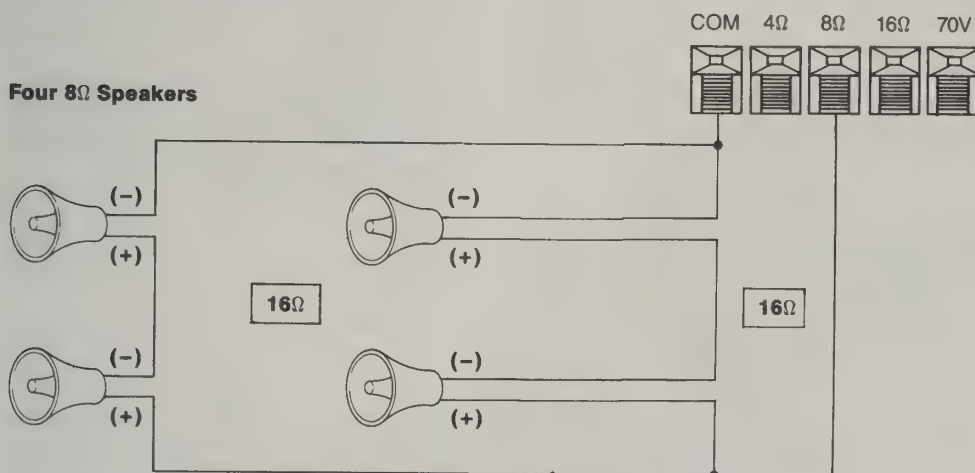
Caution: A total impedance that is too high or too low can damage your amplifier or speakers.

You can arrive at a proper total impedance by combining series and parallel connections. In the following example, we show the connection of four 8-ohm speakers.

First, connect each pair of speakers in series. Each pair has a total impedance of 16 ohms ($8+8=16$).

Next, divide 16 (the impedance of one pair of speakers) by 2 (the number of pairs) for a total impedance of 8 ohms. After you determine the total impedance, connect the two pairs of speakers in parallel.

Four 8Ω Speakers



CONNECTING SPEAKERS WITH TRANSFORMERS

If you connect two or more speakers in your system, you can use a line transformer (Cat. No. 32-1031) for each speaker.

Transformers offer these advantages:

- You can use speakers that have different impedances without causing differences in output between the speakers.
- You can add or remove a speaker from the system without having to recalculate the impedance for the entire system.

- You can reduce signal loss when you use runs of speaker wire over 50 feet long.

Note: Use 18-gauge speaker wire for lengths up to 25 feet, and use 16-gauge wire for lengths more than 25 feet.

Line transformers have several connectors called taps. The primary taps are on one side of the transformer, and are marked as 10, 5, 2.5, 1.25, and 0.62 watts. The secondary taps are on the other side of the transformer, and are marked as 4, 8, and 16 ohms.

Connecting the Primary Taps

Before you connect speakers, be sure the total wattage of the primary taps you intend to use does not exceed the amplifier's power rating of 35 watts. In the following example, the total wattage is 8.75 watts.

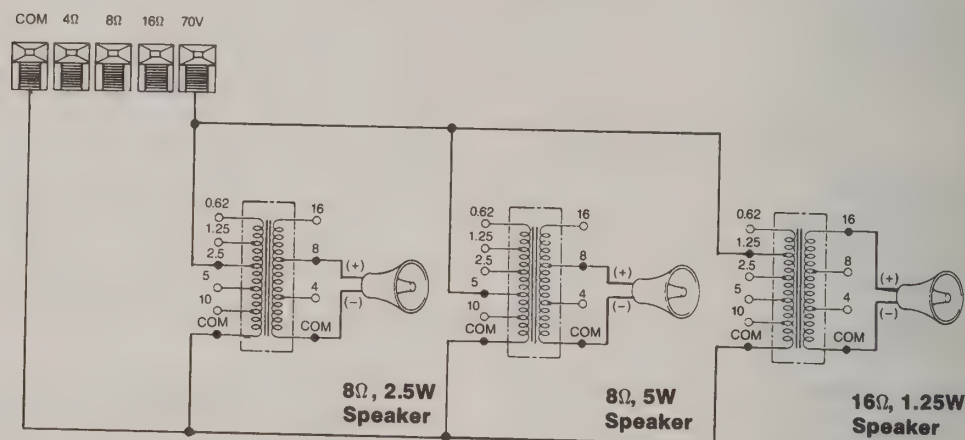
Note: Use the connections shown below to avoid multiple connections to the amplifier's COM and 70V terminals.

To connect the transformers' primary taps, follow these steps.

1. Connect the desired primary taps to the amplifier's 70V terminal, as shown.

Note: Usually, each speaker in a system uses the same tap wattage. If you want a particular speaker to have a higher volume level, use a higher wattage tap on its transformer.

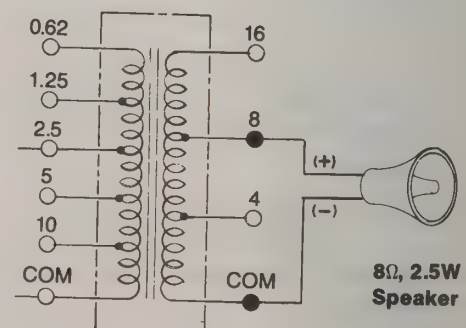
2. Connect the COM (common) taps on the transformers' primary side to the amplifier's COM (common) terminal, as shown.



Connecting the Secondary Taps

To connect the secondary taps of each transformer, follow these steps.

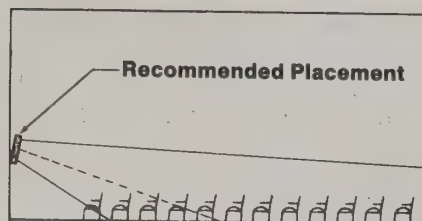
1. Connect the speaker's positive (+) terminal to the transformer's secondary tap that matches the speaker's impedance.
2. Connect the speaker's negative (-) terminal to the COM (common) tap on the transformer's secondary side.



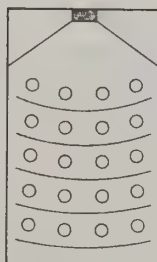
SPEAKER PLACEMENT

Finding the best speaker placement requires some experimenting. For the best results, point the speakers toward the listeners, and mount the speakers slightly above the level of the listeners' heads. The following drawings show recommended speaker placements for typical, narrow, and wide sound coverage.

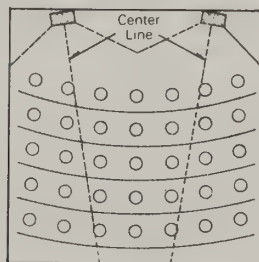
Hint: If you need to place speakers far apart, point them toward the main listening area so that the speakers' coverage areas overlap. This helps prevent *dead spots* (areas not covered by the speakers' sound).



Typical Coverage



Single Speaker
(Narrow Coverage)



Two Speakers
(Wide Area Coverage)

USING YOUR AMPLIFIER

Before you use your amplifier, be sure you choose a proper location. Avoid placing the amplifier near a heat source such as a vent, radiator, and so on. Also, be sure there is adequate ventilation. For example, avoid placing the amplifier on thick carpeting. Doing so can restrict the air flow.

Follow these steps to use your amplifier.

1. Set MASTER VOLUME and the mixing controls (MIC 1, MIC 2, and AUX/PHONO) to 0.
2. Press in POWER. The POWER indicator lights.
3. If you connected a source to the PHONO or AUX input jacks, set the AUX/PHONO switch to the proper position.
Note: A phonograph and an auxiliary source can be connected at the same time, but you can operate only one of these devices at a time.
4. Start the sound source.
5. Set MASTER VOLUME to 10. Then, adjust the mixing controls (MIC 1, MIC 2, and AUX/PHONO) for the desired volume and balance.

6. Adjust the FREQUENCY EQUALIZER controls to adjust the sound level for three different frequency ranges (150 Hz — low sounds, 1 kHz — middle sounds, and 6 kHz — high sounds) with ± 12 dB. At the center position, the sound is not affected.

After you get the desired sound, adjust MASTER VOLUME as desired.

Caution: Be careful not to raise the volume level too high. Doing so might cause the system to overload.

7. When you finish using the amplifier, press POWER to turn off the amplifier.

Using the Priority Terminals

You can connect any SPST (single-pole, single throw) switch to the amplifier's PRIORITY terminals. Activating this switch gives priority to the MIC 1 input and disables all other inputs. This is ideal for paging or making announcements.

You can use normal two-conductor wire up to 200 feet long to connect the SPST switch. Your local Radio Shack store sells several SPST switches and the appropriate wire for this connection. Refer to the switch's owner's manual for specific connection instructions.

TROUBLESHOOTING

If you have problems with the amplifier, use the following checklist to find the problem:

- Check all the connections.
- Be sure none of the speaker wiring, microphone cables, or other connecting cables are defective.
- Be sure you have provided adequate ventilation.
- Be sure you correctly calculated the total speaker impedance.
- Be sure there is no defective microphone connected.
- Be sure the speaker wire you use is a large enough gauge: 18-gauge for lengths of wire up to 25 feet and 16-gauge for lengths over 25 feet. For the best results, we recommend you use the shortest length of wire possible.

- If you have feedback problems, reposition the microphones and speakers and adjust the FREQUENCY EQUALIZER controls if necessary.

- If the amplifier does not work at all, check the amplifier's fuse (on the back panel). If the fuse is blown, replace it with the supplied spare fuse or an identical 2-amp, 250-volt fuse.

If none of the above solves the problem, take the amplifier to your local Radio Shack store. Our personnel will assist you and arrange for service, if needed.

MAINTENANCE

Your MPA-45 PA Amplifier is an example of superior design and craftsmanship. The following suggestions will help you care for the amplifier so that you can enjoy it for years.



Keep the amplifier dry. If it does get wet, wipe it dry immediately. Liquids can contain minerals that corrode electronic circuits.



Use and store the amplifier only in normal temperature environments. Temperature extremes can shorten the life of electronic devices, and distort or melt plastic parts.



Handle the amplifier gently and carefully. Dropping it can damage the circuit boards and case and can cause the amplifier to work improperly.



Keep the amplifier away from dust and dirt, which can cause premature wear of parts.



Wipe the amplifier with a dampened cloth occasionally to keep the amplifier looking new. Do not use harsh chemicals, cleaning solvents, or strong detergents to clean it.

SPECIFICATIONS

Output Power at 4 ohms 1kHz, 5% THD	35 watts
Power Bandwidth at 10W, 5% THD	40Hz — 45kHz
T.H.D. at 20W, 1kHz with 30kHz Low Pass Filter	
MIC 1	0.13%
MIC 2	0.13%
AUX	0.06%
PHONO	0.5%
Input Sensitivity at 5% THD, 1kHz	
MIC 1	2.2mV
MIC 2	2.2mV
AUX (L/R EACH)	150mV
PHONO (L/R EACH)	2.4mV
Signal-to-Noise Ratio (Input Shorted)	
with 30kHz Low Pass Filter	
MIC 1	65dB
MIC 2	65dB
AUX	71dB
PHONO	61dB
Frequency Response at 4 ohms 1W \pm 3dB	
MIC 1	67Hz — 20kHz
MIC 2	67Hz — 20kHz
AUX	67Hz — 20kHz
PHONO (RIAA 100Hz/10kHz)	\pm 12.7dB/ \pm 12.8dB
Frequency Equalizer Controls, (Aux Input, 2V/4 OHMS Output)	
150Hz	\pm 12dB
1kHz	\pm 12dB
6kHz	\pm 12dB
Hum and Noise at 4 ohms with 30kHz Low Pass Filter	
at Master Volume Min	0.19mV
at Master Volume Max (Other Min, Tone Center)	3.2mV
Power Requirement	120V AC 60Hz
Dimensions (H×W×D)	77×290×195 mm
Weight	9.7 Lbs

NOTES

NOTES

RADIO SHACK LIMITED WARRANTY

This product is warranted against defects for 1 year from date of purchase from Radio Shack company-owned stores and authorized Radio Shack franchisees and dealers. Within this period, we will repair it without charge for parts and labor. Simply **bring your Radio Shack sales slip** as proof of purchase date to any Radio Shack store. Warranty does not cover transportation costs. Nor does it cover a product subjected to misuse or accidental damage.

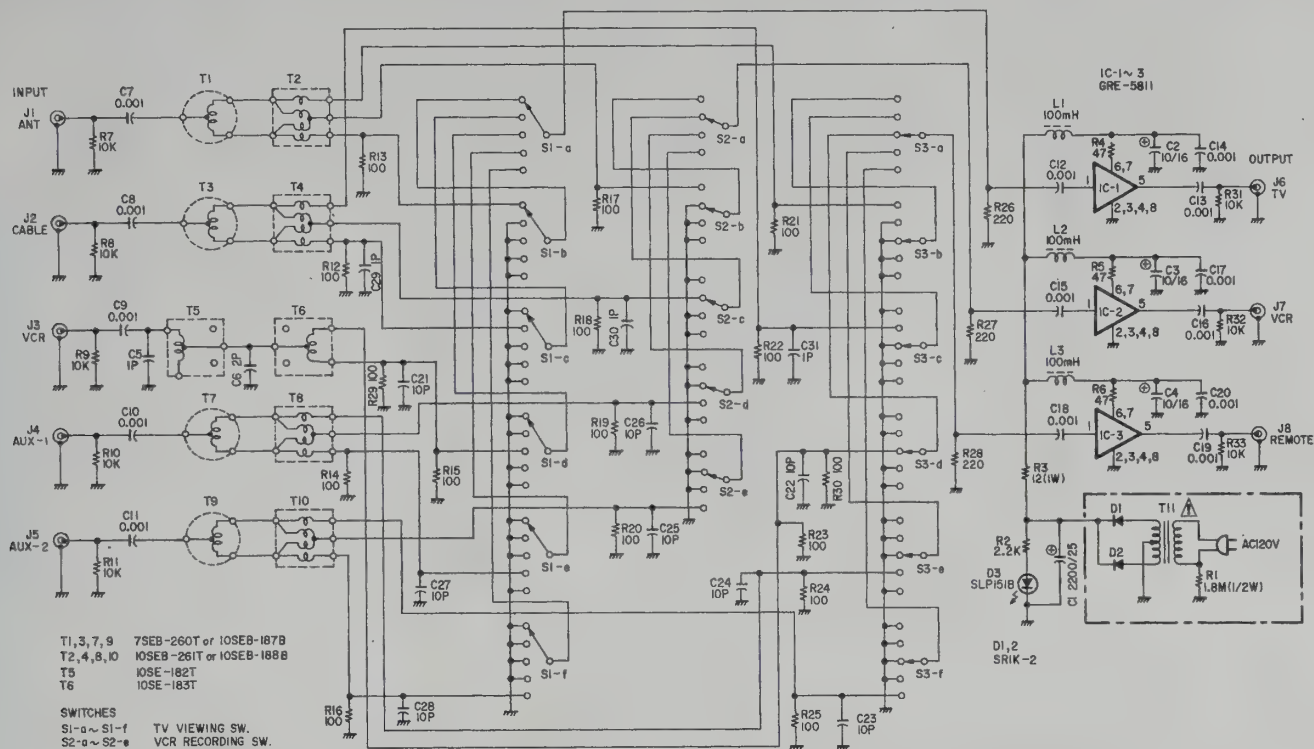
EXCEPT AS PROVIDED HEREIN, RADIO SHACK MAKES NO WARRANTIES, EXPRESS OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. Some states do not permit limitation or exclusion of implied warranties; therefore, the aforesaid limitation(s) or exclusion(s) may not apply to the purchaser.

This warranty gives you specific legal rights and you may also have other rights which vary from state to state.

We Service What We Sell

RADIO SHACK
A Division of Tandy Corporation
Fort Worth, Texas 76102

SCHEMATIC DIAGRAM



Copyright 1986

CAUTION
SINCE THE COMPONENTS MARKED BY Δ ARE CRITICAL FOR SAFETY, USE ONES DESCRIBED ON PARTS LIST ONLY

NOTE
RESISTANCE VALUES IN OHMS (k=1000, M=1,000,000)
CAPACITANCE VALUES IN μ F (μ = μ F)

Connections for Video Dubbing

The Amplified Video selector provides an easy way to copy tapes from one VCR to another.

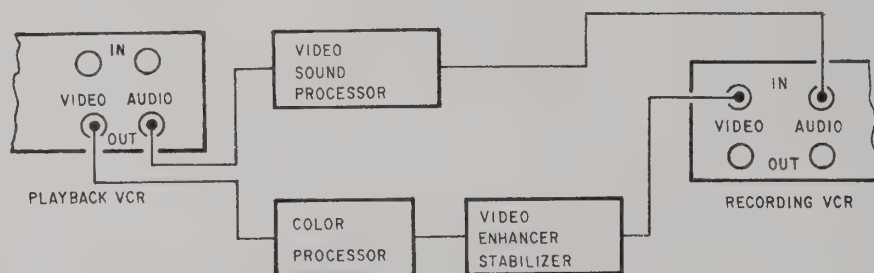
1. Use a VCR connected to one of the input jacks as the playback VCR.
2. Use a VCR connected to one of the output jacks as the recording VCR.

3. Set the output selector for the VCR input source.
4. Set the recording VCR to the same channel as the channel 3-4 switch on the playback VCR.
5. Begin recording on the output VCR and play back on the source VCR.

Alternate Connections for Video Dubbing

Although the above steps provide a quick and simple way to copy a tape, it is not the preferred way of dubbing. For optimum results you should connect the audio/video out jacks of the source VCR directly to the audio/video in jacks of the recording VCR.

This type of dubbing will produce better quality copies and also allows the use of separate video and audio processors to further enhance the dubbing quality.

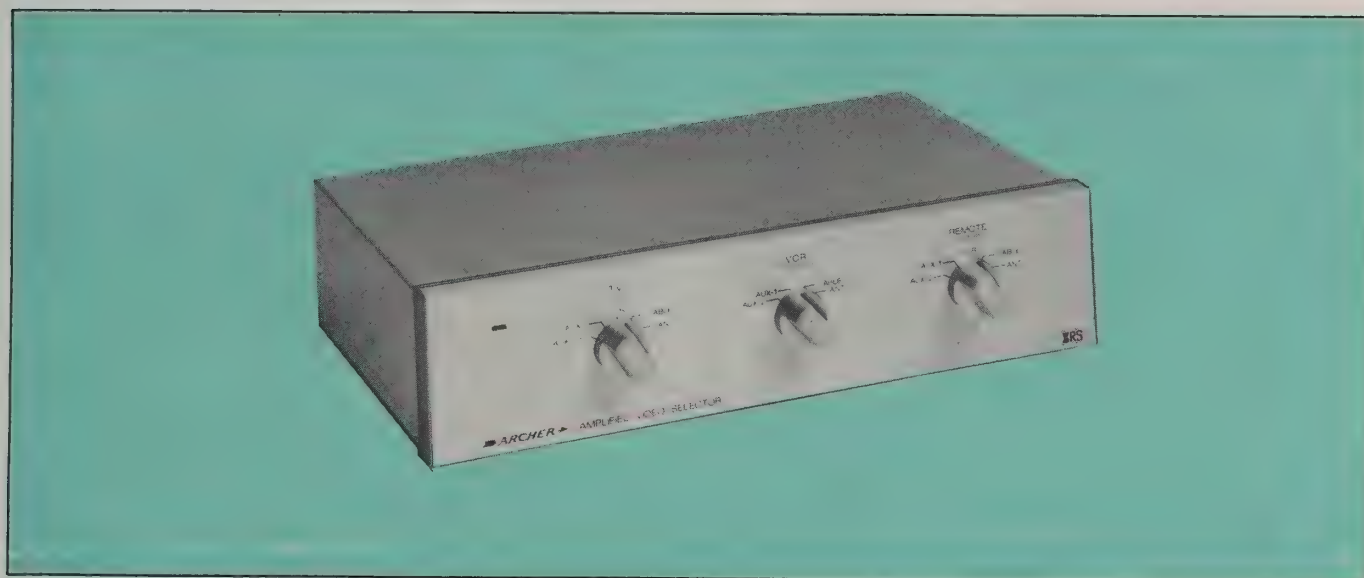


OWNER'S MANUAL

Cat.No.15-1264

AMPLIFIED VIDEO SELECTOR

PLEASE READ BEFORE USING THIS EQUIPMENT



ARCHER®

FEATURES

Your Archer® Amplified Video Selector is designed to help simplify connections in video systems that have multiple input sources (antenna, cable TV, VCR, video disc player, satellite receiver, etc.) and output receivers (VCR, TV, etc.). You no longer have to physically move cables when you want to record or view a different source. The Video Selector allows you to do the switching electronically.

Three built-in amplifiers eliminate switching and splitting signal loss over the full range of broadcast TV signals, VHF and UHF, while maintaining the separation between output signals. However, the built-in amplifiers supply only enough gain to compensate for switching and splitting loss. If you are using long runs of cable or have weak-signal problems, you will need an additional amplifier, such as 15-1118.

- Compatible with any VHF/UHF FM input source
- Three outputs – TV, VCR, REMOTE TV
- Five inputs – ANTENNA, CABLE, VCR, AUX 1, and AUX 2
- Separate amplifiers for each output to compensate for line loss
- Standard coaxial cable connectors for all inputs/outputs

Caution: The power cord is equipped with a polarized AC plug, one blade is wider than the other. The plug fits into an outlet in only one way. Do not attempt to defeat this safety feature.

CONTENTS

Typical System Connections	4
Outputs	4
Inputs	5
Operation	6
Operation Summary	6
Operation Hints	9
Alternate Component Connections	9
Connections for Video Dubbing	10
Alternate Connections for Video Dubbing ..	10
Maintenance	11
Schematic Diagram	12

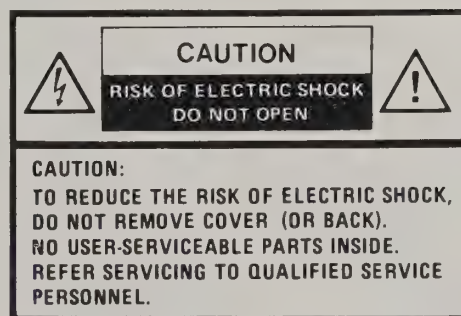
WARNING: TO PREVENT FIRE OR SHOCK HAZARD, DO NOT EXPOSE THIS APPLIANCE TO RAIN OR MOISTURE.

For your own protection, we urge you to record the serial number of this unit in the space provided. You'll find the serial number on the back panel of this unit.

Serial Number _____

Note to Cable TV System Installer:

This reminder is provided to call the CATV system installer's attention to article 820-22 of the NEC that provides guidelines for proper grounding and, in particular, that which specifies the cable ground should be connected to the grounding system of the building as close to the point of cable entry as is practical.



The lightning flash with arrowhead within the triangle is intended to alert the user to dangerous voltage inside this unit that can cause shock. Do not open enclosure.



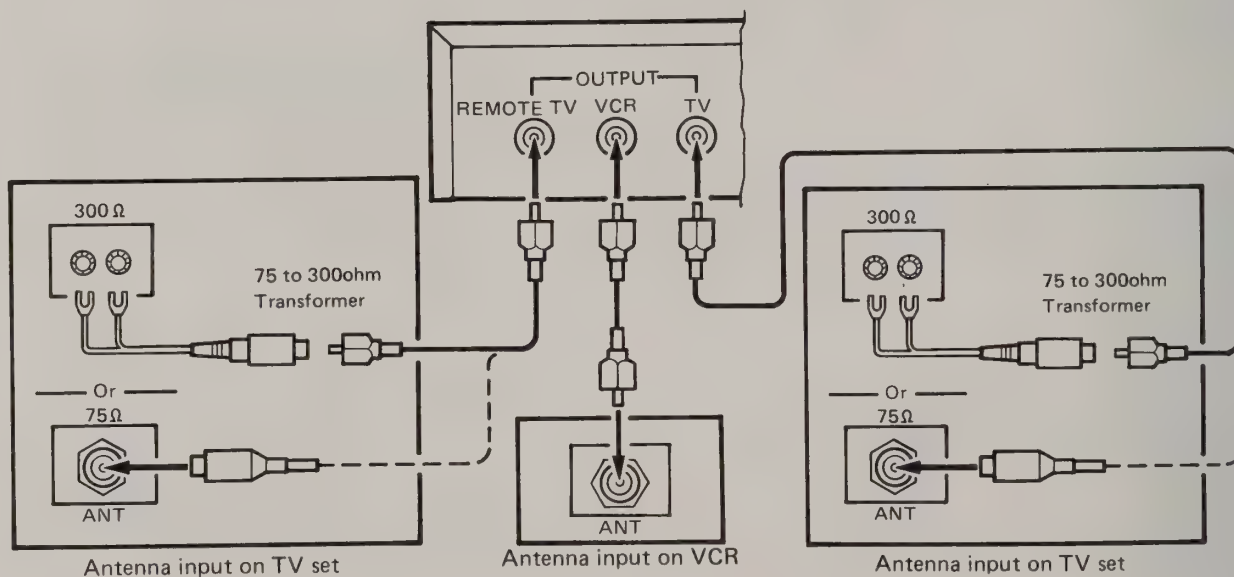
The exclamation point within the triangle is intended to alert the user to important operating and maintenance instructions in this owner's manual.

TYPICAL SYSTEM CONNECTIONS

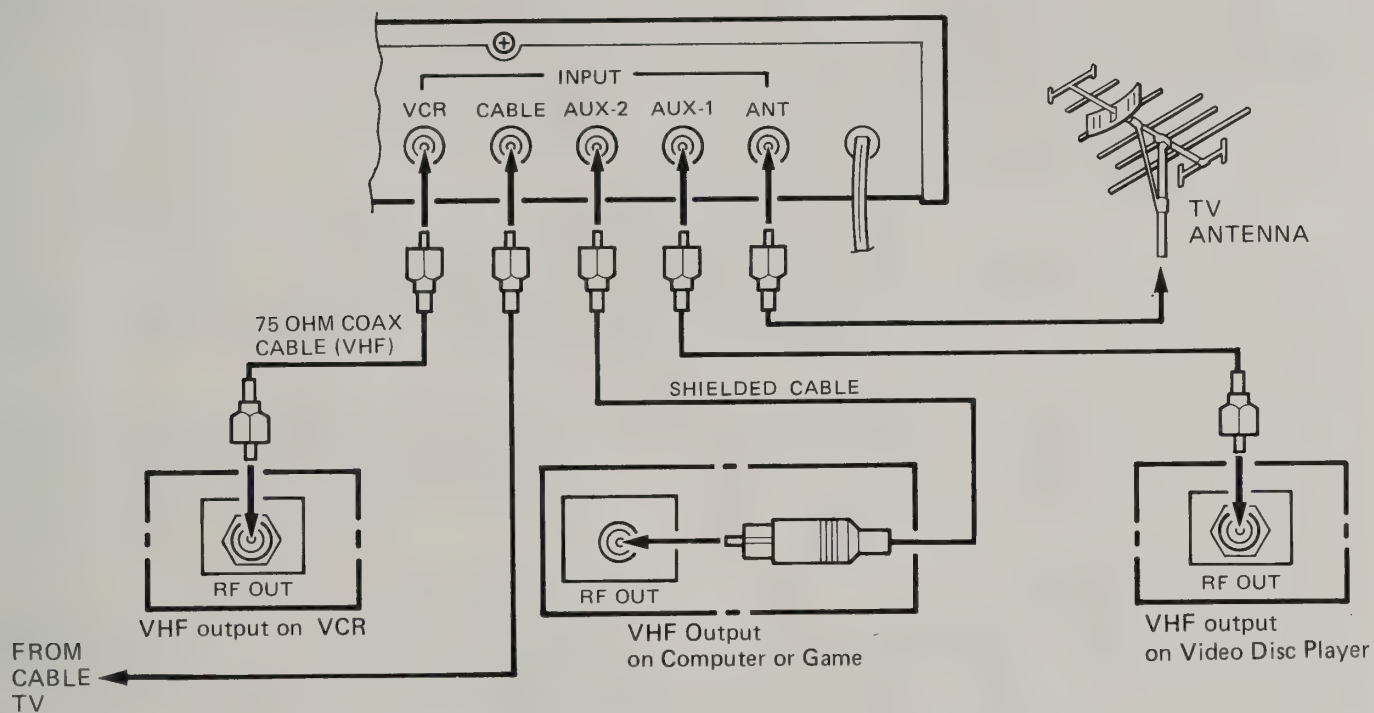
Outputs

Caution: Do not plug in this unit until all connections are complete.

- If you are using a combination VHF/UHF antenna, you will need a VHF/UHF splitter to make connection to the output TVs or VCRs. All accessories required are available at your Radio Shack store.



Inputs

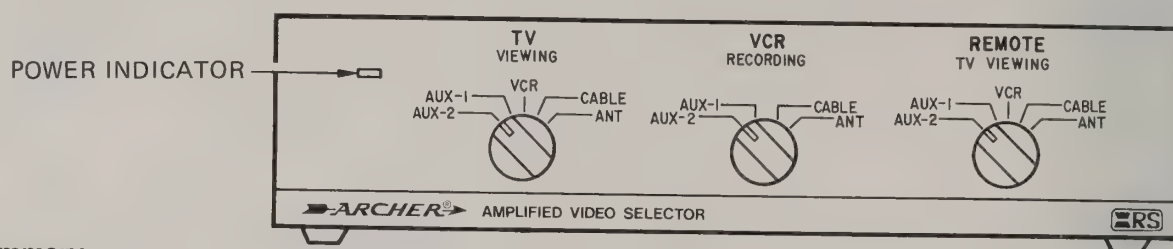


See page 9 for alternate components that may be connected to the Amplified Video Selector.

OPERATION

Before using the Video Selector:

- Double check all connections.
- Plug in the Video Selector.
The Video Selector always remains on.
- Plug in all the other equipment in the system. Use the On/Off switches of the individual components.



Operation Summary

The charts below show the proper control settings when all the inputs and outputs are used with components as labeled on the Video Selector.

You may view or record the same source on all three receivers, or you may view or record a different source on each receiver.

TV or REMOTE TV Viewing

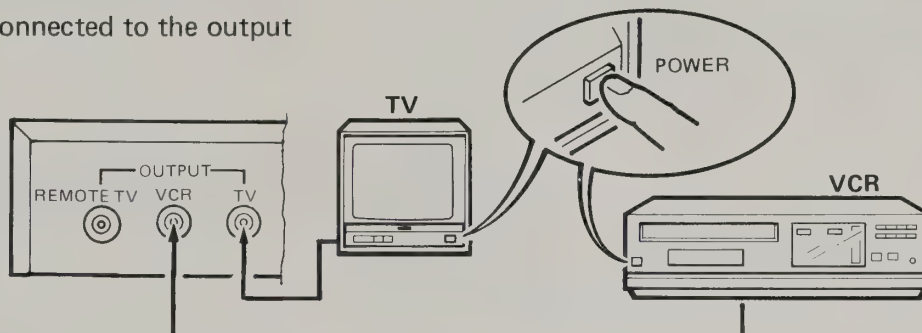
When video is from:	Set switch at:
Normal TV	ANT.
Cable TV	CABLE
Video Recorder	VCR
Signals connected to AUX-1 or 2	Corresponding AUX.

VCR Recording

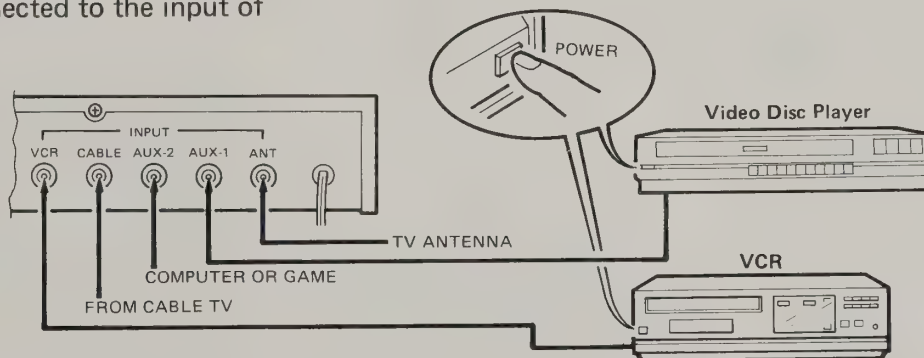
When video is from:	Set switch at:
Normal TV	ANT.
Cable TV	CABLE
Signals connected to AUX-1 or 2	Corresponding AUX.

Power on

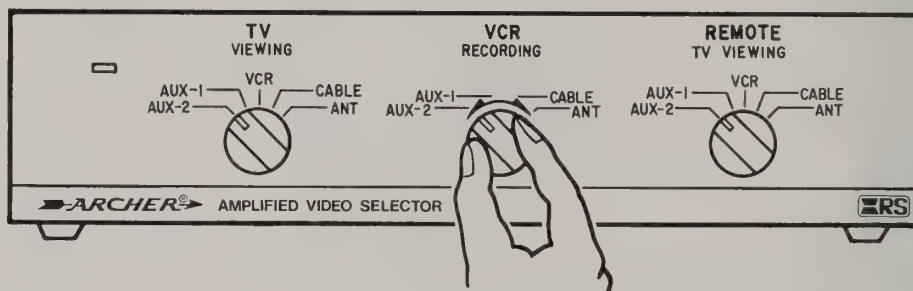
1. Turn on the VCR or TV connected to the output of the Video Selector.



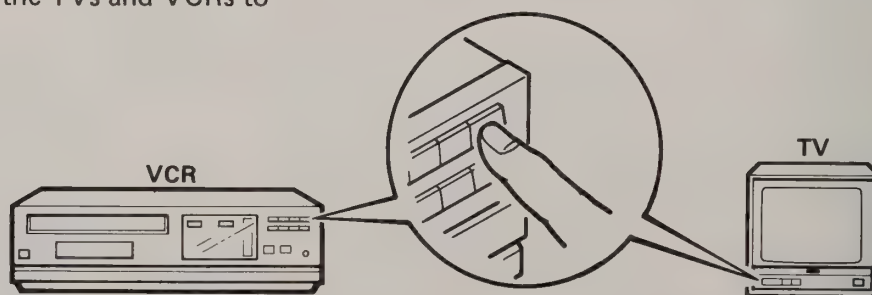
2. Turn on components connected to the input of the Video Selector.



3. Set the Video Selector controls for the desired input. Example shown is for a VCR tape to be recorded.



4. Set the channel switches on the TVs and VCRs to the correct channels.



Operation Hints

- Cable and Antenna TV sources are instantly activated upon turning on the power. However, you have to load and activate VCRs, Video Disc Players, and Color Computers.
- Some computers have RCA-type connectors. For best results, this connection should be made with a shielded video cable. You will find the cable and connectors required in the Radio Shack Video Dubbing Kit, Cat. No. 15-1525.
- Don't forget that cable TV and VCRs usually convert all their outputs to either Channel 3 or 4. Be sure to have the receiving TV or VCR set to the corresponding channel.

If you have more than one unit that converts programs to channel 3 or 4, it is best to set them to different channels.

Alternate Component Connections

OUTPUTS — The three OUTPUTS are labeled on the rear panel to correspond to the front panel OUTPUT selector settings. These OUTPUTS are identical and interchangeable. You may connect three TVs, three VCRs, any combination of these. All connections are made with standard coaxial cable connectors.

However, if you are using antenna or cable signals in your system, these must be connected to the ANT or CABLE inputs. These inputs are designed to provide the high degree of isolation needed for these signals. All the connections are made with standard coaxial cable with F-connectors.

Connections for Video Dubbing

The Amplified Video selector provides an easy way to copy tapes from one VCR to another.

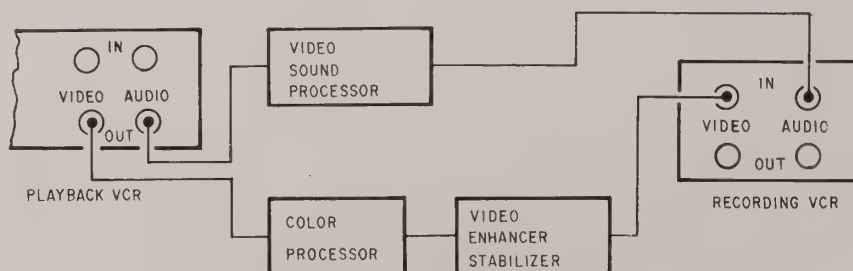
1. Use a VCR connected to one of the input jacks as the playback VCR.
2. Use a VCR connected to one of the output jacks as the recording VCR.

3. Set the output selector for the VCR input source.
4. Set the recording VCR to the same channel as the channel 3-4 switch on the playback VCR.
5. Begin recording on the output VCR and play back on the source VCR.

Alternate Connections for Video Dubbing

Although the above steps provide a quick and simple way to copy a tape, it is not the preferred way of dubbing. For optimum results you should connect the audio/video out jacks of the source VCR directly to the audio/video in jacks of the recording VCR.

This type of dubbing will produce better quality copies and also allows the use of separate video and audio processors to further enhance the dubbing quality.



MAINTENANCE

Your Video Selector is an example of superior design and craftsmanship, and should be treated with care. The suggestions below will help you enjoy this product for many years.



Keep it dry. If water should get on it, wipe it off. Water contains minerals that can corrode electronic circuits.



Do not store in hot areas. High temperatures can shorten the life of electronic devices, damage batteries, and warp or melt certain plastics.



Do not drop it. This might cause permanent damage. The circuit boards and case can be broken.



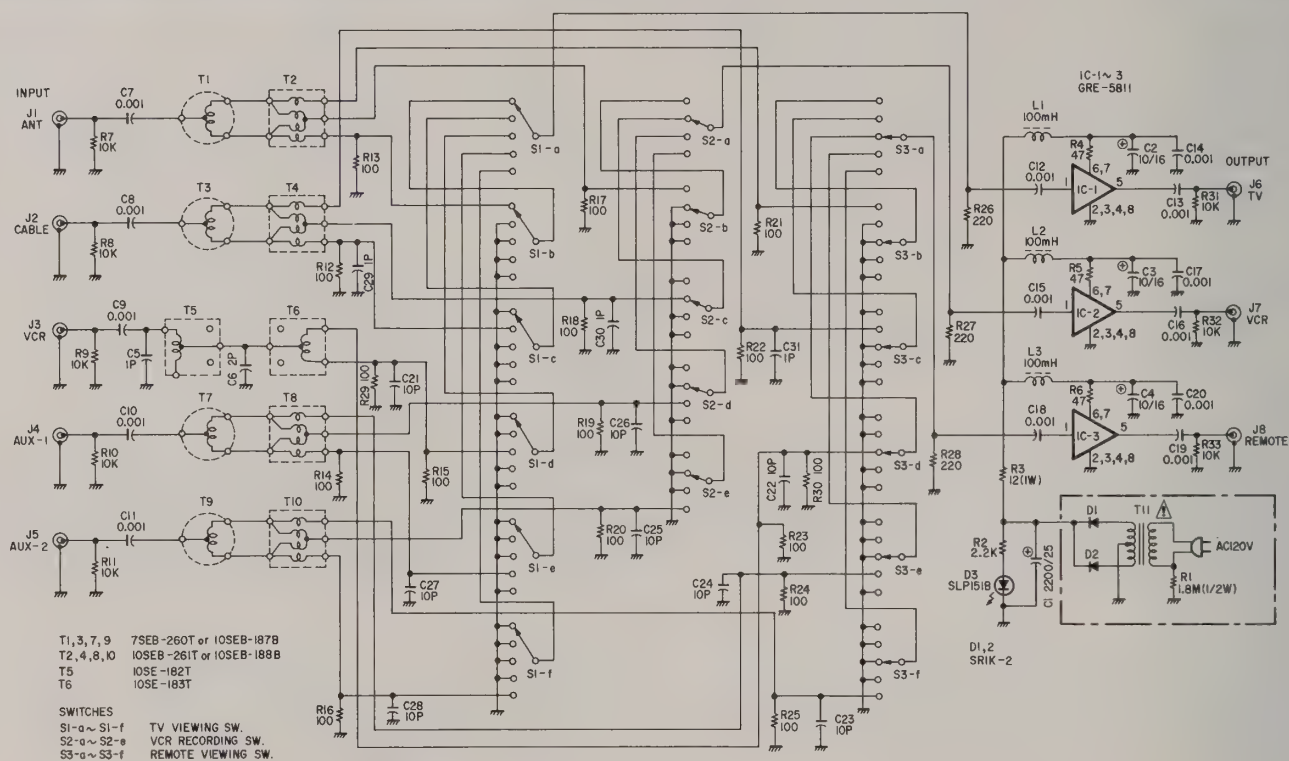
Do not use or store it in dusty, dirty areas. This will cause premature wear of moving parts.



Do not use harsh chemicals, cleaning solvents, or strong detergents to clean it. Wipe it with a soft cloth dampened in a mild soap and water solution.

If the unit is not working properly, take it to your local Radio Shack. The personnel there will assist you and, if necessary, arrange service.

SCHEMATIC DIAGRAM



Copyright 1986

CAUTION
SINCE THE COMPONENTS MARKED BY Δ ARE CRITICAL FOR SAFETY, USE ONES
DESCRIBED ON PARTS LIST ONLY

NOTE:
RESISTANCE VALUES IN OHMS (K=1000, M=1,000,000)
CAPACITANCE VALUES IN μ F (P= μ F)

NOTES

Schematic subject to change without notice. For most accurate Schematic
(and parts) contact Radio Shack, National Parts Dept., Fort Worth, TX 76101

NOTES

NOTES



RADIO SHACK LIMITED WARRANTY

This product is warranted against defects for 90 days from date of purchase from Radio Shack company-owned stores and authorized Radio Shack franchisees and dealers. Within this period, we will repair it without charge for parts and labor. Simply **bring your Radio Shack sales slip** as proof of purchase date to any Radio Shack store. Warranty does not cover transportation costs. Nor does it cover a product subjected to misuse or accidental damage.

EXCEPT AS PROVIDED HEREIN, RADIO SHACK MAKES NO WARRANTIES, EXPRESS OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. Some states do not permit limitation or exclusion of implied warranties; therefore, the aforesaid limitation(s) or exclusion(s) may not apply to the purchaser.

This warranty gives you specific legal rights and you may also have other rights which vary from state to state.

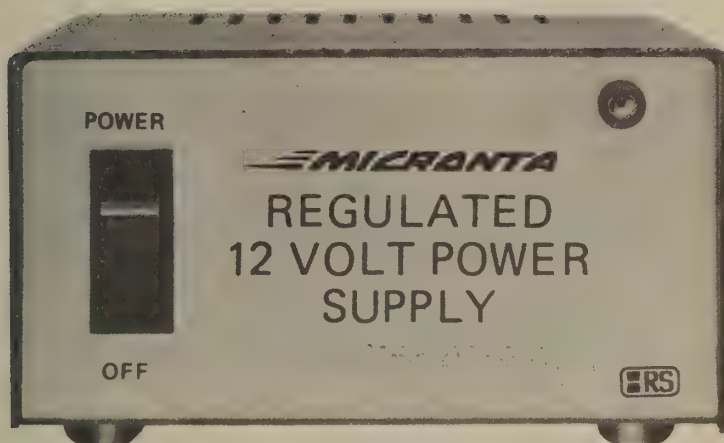
We Service What We Sell

RADIO SHACK
A Division of Tandy Corporation
Fort Worth, Texas 76102

OWNER'S MANUAL

Please Read Before
Using This Equipment

MICRONTA®



12-Volt DC Regulated Power Supply

CAT. NO.
22-124

CUSTOM MANUFACTURED IN U.S.A. BY RADIO SHACK **TC** A DIVISION OF TANDY CORPORATION

Your power supply ...

... converts ordinary household current into 12-volt DC.

You can use it to power almost any auto accessory — car radios and tape players or mobile CB and communications gear. It will even recharge 12-volt batteries. And because it's regulated, it makes an ideal bench power supply for hobbyists and technicians.

For safety, your new power supply is protected against overloads and its rugged solid-state construction should provide years of reliable service.

Specifications

Input..... 120 VAC, 60 watts max.
Output .. 13.8 VDC, 2.5 amps continuous (5 amps, surge)

CAUTION: Do not expose to rain. Replace defective cords or wires immediately.

BEFORE MAKING CONNECTIONS:

1. Be sure the Power Supply is unplugged.
2. Press the POWER switch to OFF.

Connections

Connect the (+) wire from the equipment you want to power to the OUTPUT (+) screw on the rear panel of the Power Supply and the (—) or ground wire to the OUTPUT(—) screw.

Now plug the Power Supply into a standard wall outlet.

Operation

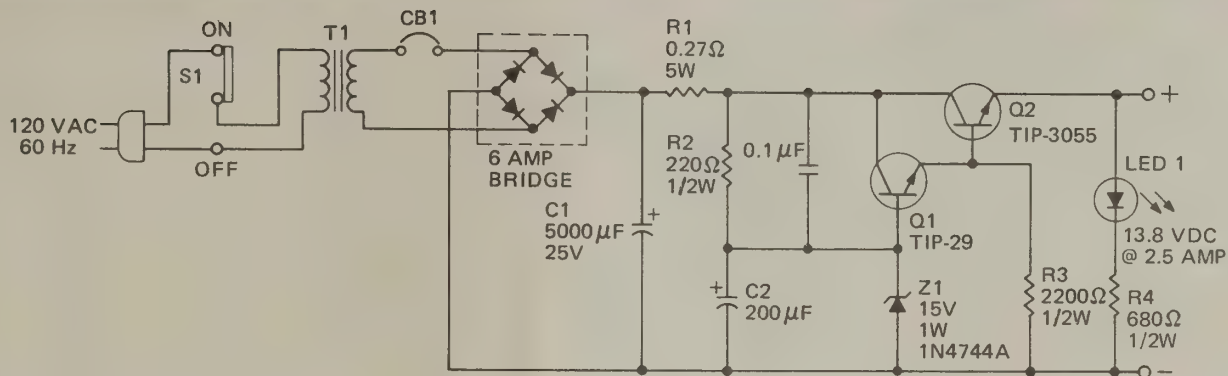
Press in the dot on the upper portion of the POWER switch to turn the Power Supply on. The light-emitting diode on the front panel should light to indicate that power is available.

Operate the radio, tape player, etc. according to the manufacturer's instructions.

To turn the Power Supply off, press the lower portion of the POWER switch to OFF.

NOTE: If the light-emitting diode does not light and there is no output, check the circuit breaker on the rear panel. If necessary, reset it.

Schematic



Maintenance

Your Micronta Power Supply is designed and built for dependability. However, like any piece of electronic equipment, it should not be abused. Keep it away from heating equipment and do not put it in extremely humid areas.

Your Power Supply has a circuit breaker to protect against overloads. If the circuit breaker "pops out", check your connections and be sure the equipment you are powering does not draw more than 2.5 amps. Then reset the circuit breaker by pushing in on the protruding reset staff on the rear of your Power Supply.

Parts List

DESCRIPTION	PART NO.
Electrolytic Capacitor 5000 μ F @25V	992-0112
Electrolytic Capacitor 220 μ F @ 16V	992-0014
Disc Capacitor 0.1 μ F @25V	992-0144
Transformer	993-0404
Transistor MJE3055K	994-0923
Transistor MJE31	994-0312
Zener Diode 15V/1W	994-0699
LED HP5082-4888	994-0703
Bridge Rectifier 6 Amp	994-0695
Circuit Breaker 3.57 Amp	995-0040
Power Switch (Rocker) SPDT	996-0051
PC Board	871-0701

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This Warranty gives you specific legal rights and you may also have other rights which vary from state to state.

We Service What We Sell

RADIO SHACK  **A DIVISION OF TANDY CORPORATION**

U.S.A.: FORT WORTH, TEXAS 76102

CANADA: BARRIE, ONTARIO, CANADA L4M 4W5

TANDY CORPORATION

AUSTRALIA

280-316 VICTORIA ROAD
RYDALMERE, N.S.W. 2116

BELGIUM

PARC INDUSTRIEL DE NANINNE
5140 NANINNE

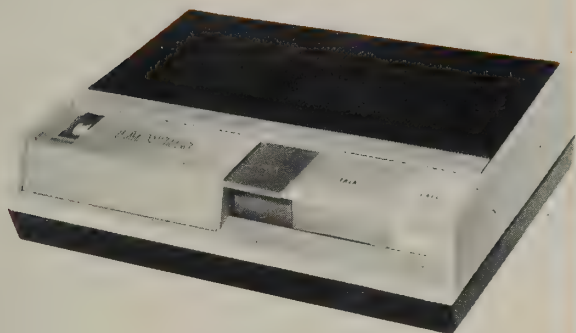
U. K

BILSTON ROAD
WEDNESBURY, STAFFS WS10 7JN

177-MP 14197 -990-0578

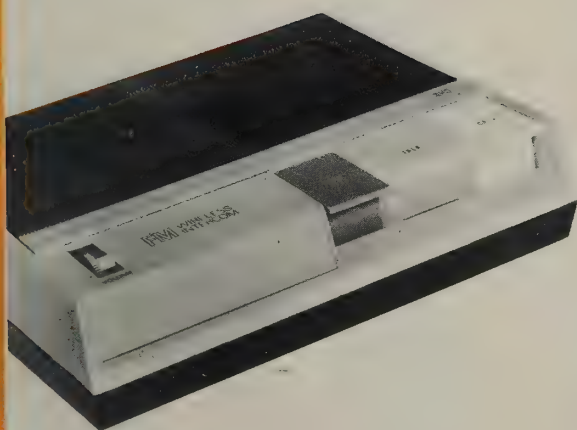
PRINTED IN U.S.A.

FM WIRELESS INTERCOM



OWNER'S MANUAL

PLEASE READ BEFORE
USING THIS EQUIPMENT



REALISTIC®

Cat. No.
43-212

CUSTOM MANUFACTURED FOR RADIO SHACK  A DIVISION OF TANDY CORPORATION

Your REALISTIC FM WIRELESS INTERCOM is a 2-unit, wireless, solid-state intercom system. The solid-state circuit is all-silicon for minimum power consumption and maximum life; 8 transistors and 1 zener diode are used, plus 5 diodes (including 2 power rectifiers). Since the circuit system is FM, it is not affected by line-noise and interference—it remains silent until a call or message comes through. It's simple to operate and install—just plug them into a source of 120 volts (220/240 volts 50 Hz where the sets are so marked on the rear) AC and you're ready to use them.

FEATURES

- FM Modulation system by varicap diode
- Built-in Squelch circuit
- Lock Button for "hands-free" long transmissions
Example: baby sitting, dictation, monitoring
- Lighted TALK bar

SPECIFICATIONS

Power Output:	300 mW at 1 kHz (with 10% THD)
Signal-to Noise Ratio:	50 dB at 7 mV input
Transmitting Section	
Frequency:	200 kHz \pm 1 kHz (193 kHz \pm 1 kHz)
RF Output Power:	55 mW across 10 ohm load
Semiconductor Complement:	8 Silicon Transistors
	4 Diodes (1 Varicap Diode)
	2 Rectifiers
	1 Varistor
Power Requirements:	120 Volts, 60 Hz, AC, 8 Watts Max. (220/240 VAC, 50 Hz,) (8 Watts Max.)

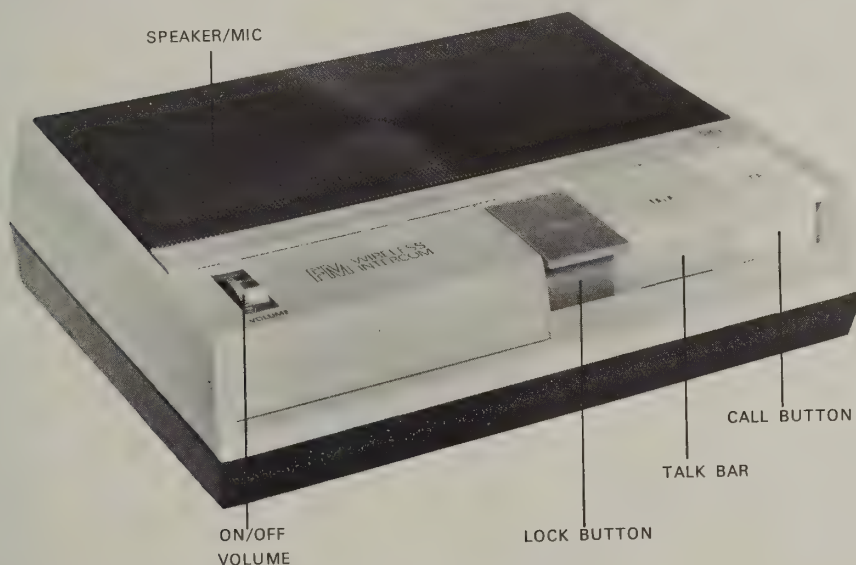
RADIO SHACK LIMITED WARRANTY

This equipment is warranted against defects for 90 days from date of purchase. Within this period, we will repair it without charge for parts and labor. Simply **bring your sales slip** as proof of purchase date to any Radio Shack store. Warranty does not cover transportation costs. Nor does it cover equipment subjected to misuse or accidental damage.

This Warranty gives you specific legal rights and you may also have other rights which vary from state to state.

We Service What We Sell

CONTROLS AND FUNCTIONS



INSTALLATION AND OPERATION

These units can be located almost anywhere in a house, office or shop, as long as there is an AC outlet conveniently available.

Determine the best location for the intercom units and plug each into AC outlets (120 volts, 60 Hz or 220/240 volts, 50 Hz where the sets are so marked on the rear).

Adjust VOLUME control to click "on" and set to about "3". To talk, press TALK bar and speak in a normal voice from arm's length (or less if desired, but not less than 3-5" (7 x 13cm) from the speaker/mic). At the receiving station, adjust VOLUME as desired.

To call a station, press and release CALL button; this produces a tone in the other unit and thus signals a call is ready. When the other station answers, press TALK and proceed with your message.

For long messages, press LOCK button down. This locks-in the Talk function for hands-free operation. To listen, press TALK bar to release the LOCK button.

The LOCK position is handy for use as a "baby sitter" or other monitoring functions, or for long periods of dictation. Thus, you can set one unit to LOCK and then listen from another unit.

OPERATIONAL NOTES

Additional intercom units can be added to the system if you want; however, they must be of the same type (other types of wireless intercoms will not work with this FM system).

These intercoms can be installed anywhere in the house, office or shop, as long as they are all connected to the same power line distribution transformer. Practically all residential and many commercial locations meet this requirement. Do not operate them too close together, or feedback between units will cause squeal.

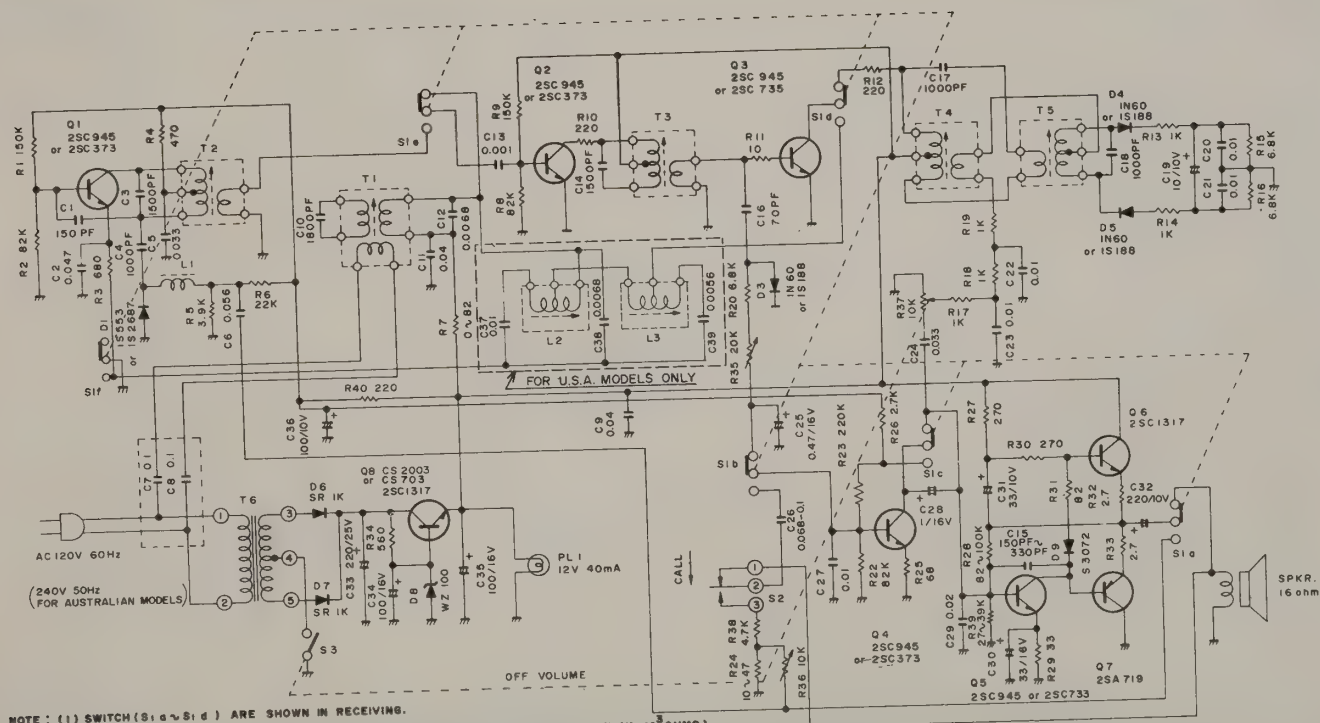
Units can be separated up to about 300 feet (90m), as long as the AC line is connected to the same side of the power distribution transformer. Thus, they may operate between adjacent homes, assuming their power comes from the same distribution transformer.

If communications is distorted, it may be you are talking too close to the speaker/microphone. Speak in a normal voice 1-3 feet (30-90cm) from the intercom for best results.

An adjustable squelch control is accessible through a hole in the back of the case. For normal conditions, no adjustment is required (the factory setting will be adequate). However, for optimum results, especially in very quiet or very noisy locations (electrical noise), adjust squelch as follows:

With the unit plugged in and no signal, adjust squelch with a small screwdriver until a hiss is heard. Slowly turn in the opposite direction to the point where the hiss just ceases. This is the optimum setting for your location.

SCHEMATIC DIAGRAM



NOTE: (1) SWITCH (S) ARE SHOWN IN RECEIVING.
(2) RESISTANCE VALUES ARE INDICATED IN OHMS UNLESS OTHERWISE SHOWN ($K=10^3$ OHMS)
(3) CAPACITANCE VALUES ARE INDICATED IN MICROFARADS UNLESS OTHERWISE SHOWN ($P=$ MICRO-MICROFARADS)

RADIO SHACK  A DIVISION OF TANDY CORPORATION

U.S.A.: FORT WORTH, TEXAS 76102

CANADA: BARRIE, ONTARIO L4M 4W5

TANDY CORPORATION

AUSTRALIA

280-316 VICTORIA ROAD
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BELGIUM

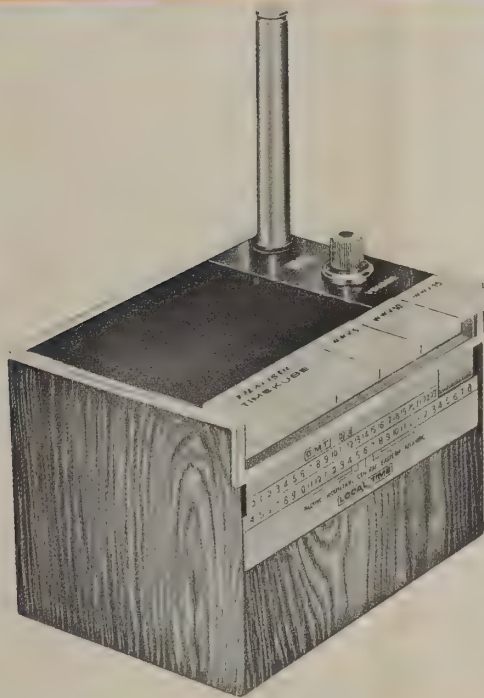
PARC INDUSTRIEL DE NANINNE
5140 NANINNE

U. K.

BILSTON ROAD, WEDNESBURY
WEST MIDLANDS WS10 7JN

Printed in Korea

TIMEKUBE




OWNER'S MANUAL

PLEASE READ BEFORE
USING THIS EQUIPMENT

REALISTIC®

CAT NO.
12-158
12-159

CUSTOM MANUFACTURED FOR RADIO SHACK  A DIVISION OF TANDY CORPORATION

Your **TIMEKUBE** is a very simple, but unique "talking timepiece". Not only that, but it's also the world's most accurate time piece. And to get this accuracy, all you have to do is — just listen to it.

It receives time signals broadcast by the National Bureau of Standards; these time signals are controlled by an atomic clock and are accurate to within 1 part in 1,000,000,000,000. That's equivalent to losing or gaining one second in 31,709 years — you must agree that's accurate!

Now you can check the accuracy of your quartz crystal or tuning fork watch and know that it is precise. Or set your old Grandfather clock by it...

Just press a button — 5, 10 or 15 MHz*— and check the time. National Bureau of Standards broadcasts time signals with this absolute accuracy, 24-hours-a-day.

There are other "time radios" on the market. However, only the **REALISTIC TIMEKUBE** gives you flexibility of 3 pushbutton frequencies to choose from. This practically assures you of reception anywhere in the USA.

And since it's battery operated and portable — pick it up and take it anywhere.

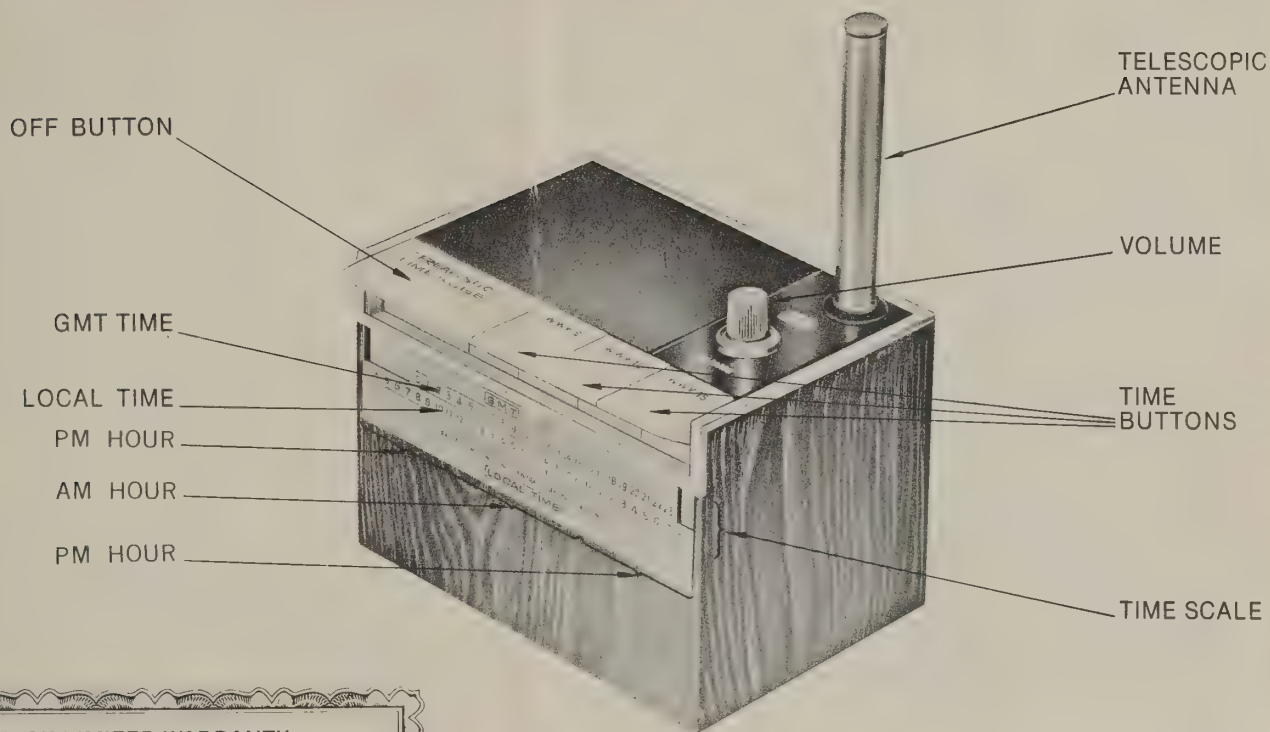
We've given you an extra-long telescopic antenna for superior reception. For the most sensitive reception, you can connect an outside antenna and ground to the Antenna and Ground terminals provided on the back.

*The Canadian model (12-158) has two CHU frequencies, 7.335 and 14.67 MHz, plus WWV 10 MHz.

Looking for a unique gift? This is it. For the man or woman who really has everything — the world's most accurate timepiece. Great for yourself or others.

SPECIFICATIONS

Circuit:	Crystal Controlled Receiver Ceramic Filter in I.F.
Sensitivity:	0.5 μ V typical (10 dB s/n)
Audio Output:	200 milliwatts or more
Antenna:	45" (115cm) telescopic Plus, terminals for external Antenna and Ground
Semiconductors:	9 silicon transistors 1 Diode 1 Thermistor
Power Requirements:	9-volt battery
Power Drain:	20-60 milliamperes
Size:	3-1/4"X4-5/8"x3-1/2" (8.25X11.7X8.9cm HWD)
Weight:	13 oz. (370g)



RADIO SHACK LIMITED WARRANTY

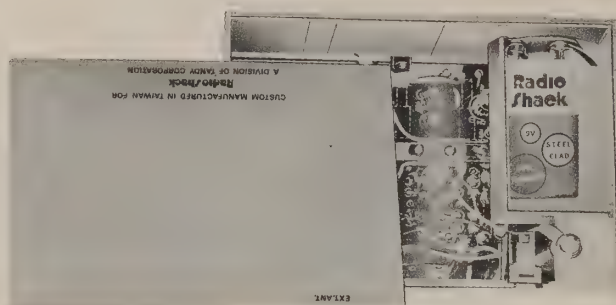
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We Service What We Sell

PREPARING THE TIMEKUBE

Before you use the **TIMEKUBE**, install the 9-volt battery. Use a coin to pry off the bottom cover. Snap the battery contacts over the 9-volt battery. Install the battery and replace the bottom cover.



USING THE TIMEKUBE

Extend the Telescopic Antenna to its full length.

Press any one of the buttons — WWV 5, 10 or 15.

Note: The Canadian model (12-158) has two CHU stations, plus WWV 10.

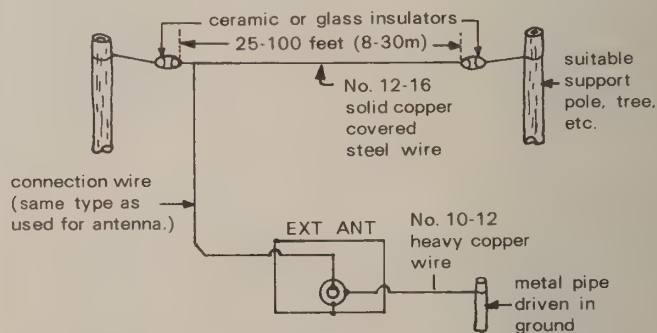
Adjust **VOLUME** for the desired sound volume.

If you don't get a good signal at one frequency, try another button.

To turn the **TIMEKUBE** off, press **REALISTIC TIMEKUBE** bar.

Reception Note: In most parts of the U.S.A. 10 MHz will be the best frequency. Reception will vary depending on the time of day, your location, atmospheric conditions and even time of the year. Use the frequency which gives the best reception — time accuracy is the same on all frequencies.

For superior reception, or in areas where you have a difficult time obtaining consistently good reception, an external antenna will help. Install the antenna outside, up and away from obstructions; run a wire from the antenna down and into your house or office and connect it to the center conductor of a miniature phone plug and then insert it into the **EXT ANT** jack on the back of the **TIMEKUBE**. For best reception, connect a wire between the outer conductor of the miniature phone plug and a cold water pipe; this provides a ground connection and insures maximum reception.



Radio Shack has a Short Wave Antenna kit which will do the job very well — Catalog Number 278-758. They also have appropriate miniature phone plugs.

SETTING THE TIME SCALE

First, you must know your Time Zone and whether you are on Standard or Daylight Saving time.

A **Time Zone** is one of the 24 regions into which the world is divided. These are established to provide 24 "hour-segments" all the way around the globe. In U.S.A. and Canada, we have 5 Time Zones — from east to west: Atlantic, Eastern, Central, Mountain and Pacific (plus another Time Zone for Alaska and Hawaii).

Daylight Saving relates to some areas in the country where in the Spring you turn the clock forward one hour. Then, in the Fall you turn it back one hour. Between Spring and Fall, that region is on Daylight Saving time. Otherwise, time is always Standard.

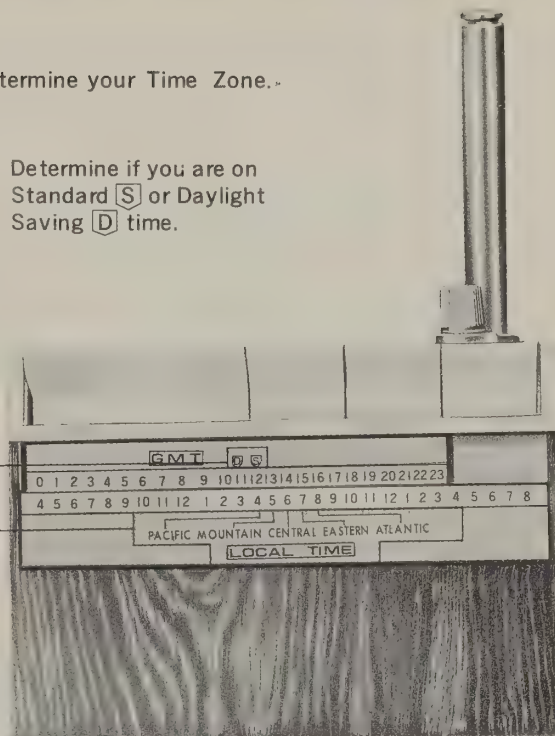
If you are on Standard time, slide **GMT** time scale so the "S" marker is directly above your time zone.

If you are on Daylight Saving time, slide the **GMT** time scale so the "D" marker is directly above your time zone.

Read Local Time opposite the **GMT** time reported by the **TIMEKUBE**.

① Determine your Time Zone.

② Determine if you are on Standard **S** or Daylight Saving **D** time.

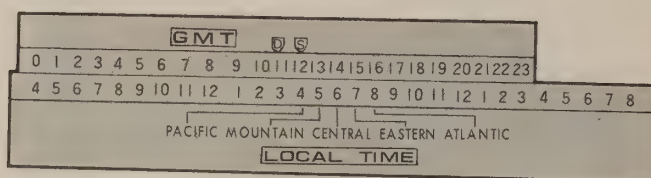


③ Line up **S** or **D** directly above your Time Zone.

④ Read local time, AM or PM, opposite **GMT** number as reported on the **TIMEKUBE**.

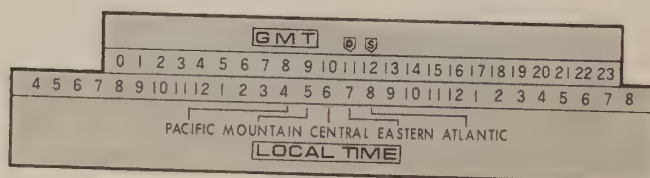
Examples:

Pacific Time Zone, Standard time.



Move "S" opposite PACIFIC.
Read Pacific Standard Time by observing the numbers which line up with the GMT time scale.
TIMEKUBE reports "...1800 hours 37 minutes GMT".
The local time would be 10:37 A.M.

Eastern Time Zone, Daylight Saving time.



Move "D" opposite EASTERN.
Read Eastern Daylight Saving Time by observing the numbers which line up with the GMT time scale.
If TIMEKUBE reports "...1100 hours 54 minutes GMT",
Local Time is 7:54 A.M.

NOTES

WWV are the call letters of the National Bureau of Standards radio station in Fort Collins, Colorado. WWVH is the NBS station in Kekaha, Kauai, Hawaii. Both stations are equally accurate. You can tell which one you hear by the announcer's voice — WWV uses a male announcer, WWVH uses a female.

Voice announcements are made every minute. WWV gives the time announcement 7-1/2 seconds before the minute. WWVH gives their announcement 15 seconds before the minute. Each second is sounded with a tick. For detailed information on the signal format and precision of timing, address: WWV, 2000 East County Road 58, Fort Collins, Colo. 80521.

The Canadian time standard signals are transmitted by CHU on 7.335 and 14.67 MHz. CHU broadcasts continuous time signals much the same as WWV. The Canadian model of the TIMEKUBE (12-158) also has the 10 MHz WWV frequency and in many parts of Canada it will be picked up very well. For detailed information, address: CHU, National Research Council, Ottawa, Ontario, Canada K1A 0S1.

The term GMT (Greenwich Mean Time) is the time at the Greenwich Observatory in England. It is used as the hour reference standard for international 24 hour time. A 24 hour clock makes one revolution of the hour hand per day—thus, 1 P.M. is 1300 by 24 hour time and 8 P.M. is 2000.

GMT is also termed "Z" or "Zulu" time, or UTC (Co-ordinated Universal Time); UTC will become the standard term for this time within a few years—so get used to it now.

Hawaii and Alaska time is 2 hours "earlier" than Pacific time. That is, subtract 2 hours from the Pacific time scale reading if you are in Alaska or Hawaii.

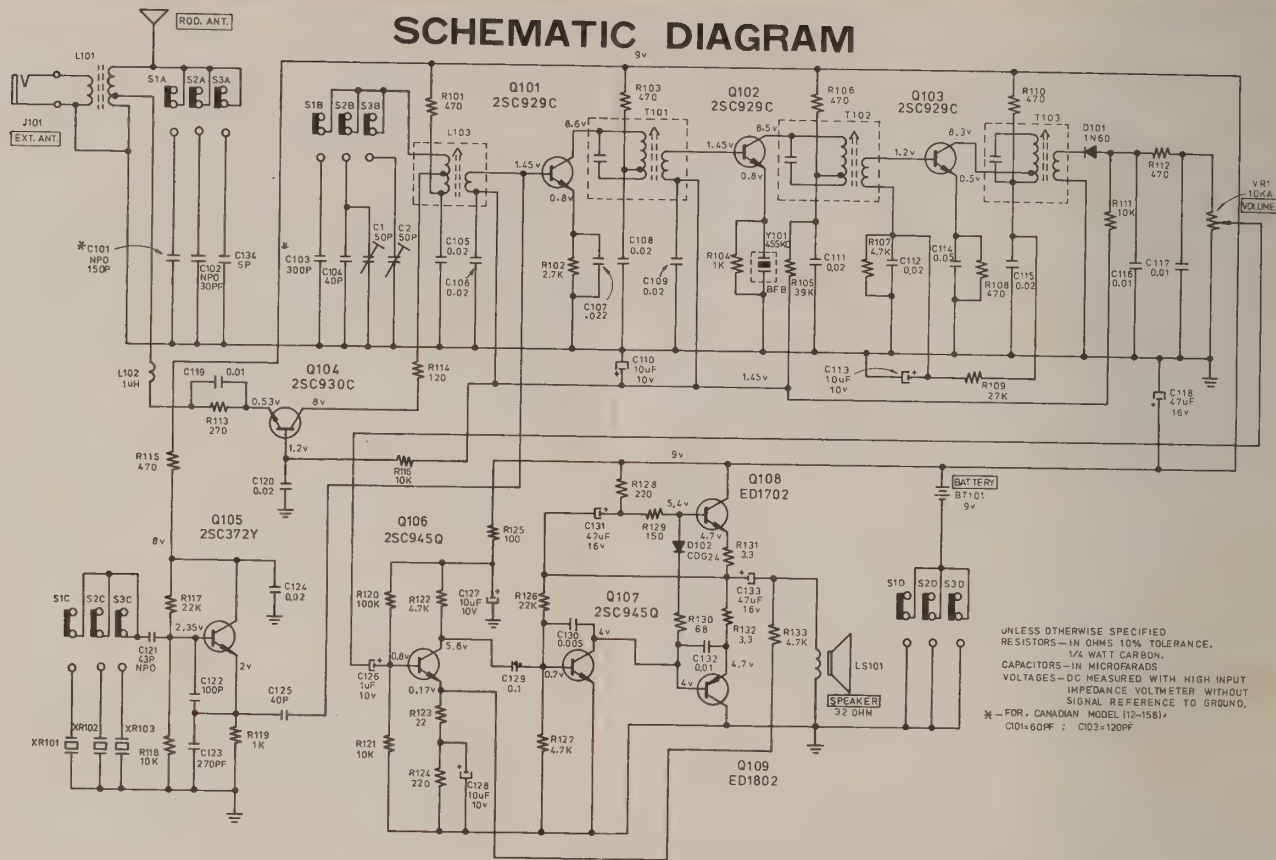
WWV and WWVH are also used to broadcast three other types of scientific information: weather, radio propagation and geoalerts. Radio propagation reports give information on radio reception conditions. Geoalerts tell of geophysical events which affect radio propagation, solar activity, stratospheric changes, etc.

For details on this information, obtain a copy of: Special Publication 236 "Standard Frequencies and Time Services" from the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402, for 45 ¢.

The frequency for best reception will vary greatly. We can't recommend any one of the three as the best for you. Reception depends on your location, the time of day, atmospheric conditions and even the time of year. That is why we have made provision for 3 frequencies. If reception is poor on one, try another. For best reception, remember to use an outside antenna and a ground connection.

If reception becomes weak, or you have to turn VOLUME up more than normal, it is time for a new 9-volt battery. We recommend Radio Shack Catalog Number 23-583 or 23-553 for extra-long life. By the way, never leave a weak or dead battery in your TIMEKUBE—damaging chemicals can leak from such batteries. If you are not going to use your TIMEKUBE for a number of months, remove the battery before storing.

Many other countries also transmit time standard signals on 5, 10 and 15 MHz; therefore, the TIMEKUBE radio may function in many other parts of the world. Or, you may even pick up foreign time signals if you have an external antenna.



RADIO SHACK **A DIVISION OF TANDY CORPORATION**

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3A7

Printed in Taiwan

BRO-2020 Scanner
(200-0112)

Operation

Faxback Doc. # 45530

Operating Your Pro-2020

Turn on your Pro-2020 by rotating [VOLUME] clockwise. (When first turned on, your Pro-2020 may start scanning).

Rotate [SQUELCH] fully counterclockwise. You'll hear a rushing noise from the speaker. Slowly rotate [SQUELCH] clockwise until the noise just stops. You're now ready to start entering frequencies.

Programming Frequencies

Before programming frequencies, make sure your Pro-2020 is turned on and the SQUELCH is adjusted.

Suppose you want to program Channel 1 to receive 162.55 MHz. Here's how you would do it:

1. Press [MANUAL] and select channel 1. You can do this in two ways: press [MANUAL] continuously until the Display indicates Channel 1 or by pressing [1] [MANUAL].
2. Press [PROGRAM] to enter the programming mode.
3. Enter the desired frequency. In this case, press the [1] [6] [2] [.] [5] [5] keys. Check the display to make sure the frequency it shows is the one you meant to program. If it is, press the [ENTER] key.
4. To add more frequencies, just press [PROGRAM] to advance to the next channel and follow the steps above.
5. If you ever want to change the frequency entered for a specific channel, just enter the new frequency "over" the old frequency using steps 1, 2, and 3.

Make a mistake while entering the frequency? Just press [CLEAR], enter the correct frequency and press [ENTER]. If you're entering a new frequency in place of an old one, the old frequency won't be "erased" when you press [CLEAR]. It will remain stored on that channel until you correctly enter a new frequency and press [ENTER].

You'll hear a "peep" sound as you press the various keys. This lets you know the key has been properly "entered" into your Pro-2020.

Using the Scanning Function

Your Pro-2020 will automatically scan all the channels you've programmed and stop whenever it finds a signal. To scan channels, just press the [SCAN] key.

To stop scanning, just press [MANUAL] and you can select specific channels you want to listen to.

IMPORTANT! Your Pro-2020 won't scan unless SQUELCH is set to the point where no sound is heard if a signal isn't being received.

Delay Function

When your Pro-2020 is scanning, it will stop whenever it finds a signal on a channel. As soon as the signal ends, the scanning function will resume. Most communications heard will be two-way. To make sure you don't miss any

replies, press [DELAY]. This will cause your Pro-2020 to stay on a channel for two seconds after the end of a transmission, giving you time to hear any reply. To release the Delay function, just press [DELAY] again. The Delay indicator will show on the display when the Delay function is used.

Lockout Function

You may want your Pro-2020 to "skip over" certain frequencies while it's scanning (such as continuously transmitted weather broadcasts). To "lock out" such channels, follow these steps:

1. Press [MANUAL] to stop scanning. Continue to press [MANUAL] to advance to the channel you want to lock out.
2. When you reach the channel, press [LOCK OUT]. The display will show [o] to indicate this channel will be skipped over during scanning.
3. To release the lockout, press [MANUAL] to stop scanning. Advance to the channel that is locked out and press [LOCK OUT] once again. [o] will disappear from the display.

If you use the lockout function on all channels, scanning will be impossible - you'll only be able to change channels using [MANUAL].

Speed Selection

Your Pro-2020 will normally scan channels at a rate of four channels per second. If you press [SPEED], channels will be scanned at a rate of nine per second. Press [SPEED] again to return to a rate of four channels per second.

Priority Function

You might want to scan other channels yet not miss a call on a channel of particular interest to you (police, fire, ambulance, etc.). The Priority function will let you scan other channels - but if a call is received on the Priority channel, your Pro-2020 will automatically switch to the Priority channel!

1. Only Channel 1 can be used as Priority Channel: Key in the desired Priority frequency into Channel 1.
2. Priority function works only when the unit is in Scan or Manual mode.
3. Press [PRIORITY] to start Priority function. A [P] will appear on the display.
4. Press [MANUAL] or [SCAN] to listen to other channels. Your Pro-2020 will check the Priority channel and switch to it if a signal is received on it.
5. To cancel Priority function, press [PRIORITY] again. the [P] will disappear from the display.

SEARCHING WITH YOUR PRO-2020

One great feature of your Pro-2020 is its ability to "search" for frequencies being used. This means you can hear all the action on the airwaves in your area! To use this great feature, just follow these steps:

1. Press [PROGRAM] key.
2. Press [LIMIT] key. Enter the lower limit of frequency range to be

- searched (such as 45.00 MHz). Press [ENTER].
3. Press [LIMIT] key again. Enter the upper limit of frequency range to be searched (such as 46.00 MHz). Press [ENTER].
4. Press either [up arrow] or [down arrow] to start Search. [Down arrow] will start search from the highest frequency and go down. [Up arrow] will start from the lowest frequency and go up.
5. You can control the speed of the search by using the [SPEED] key to accelerate or to slow down the search.
6. Search will stop when a frequency is found with a signal. To restart search, press [up arrow] or [down arrow].

In Program Mode, search range will be displayed each time [LIMIT] is pressed. It is impossible to change the lower frequency only: to change lower frequency you must change higher frequency first. The higher frequency can be changed any time.

Storing Frequencies

If you want to enter some of the frequencies found during search, do this:

1. Press [MONITOR] when your Pro-2020 finds a frequency you want to store.
2. Use [MANUAL] key to select a channel to enter the frequency your Pro-2020 found. The display will show the frequency currently stored on the channel, but don't worry - the old frequency will be erased when you start to enter the new one.
3. Press [PROGRAM].
4. Press [MONITOR] again. The new frequency found during the search will be displayed.
5. Press [ENTER] to put the new frequency into the channel in place of the old frequency.
6. Press either [up arrow] or [down arrow] to resume the search. To return to manual or program operation, press [MANUAL] or [PROGRAM]. To resume the search from one of the limit frequencies, press [LIMIT] and then [up arrow] or [down arrow].

Error Indications

Sometimes when you try to enter a frequency for a channel or as a search range limit, you may find an ----- on the display. This means the frequency is in error and you won't be able to enter it into your Pro-2020.

Such frequency errors usually mean you've entered a frequency outside the ranges your Pro-2020 operates on (such as 225.00 MHz) or you've put the decimal point in the wrong place (14.682 MHz instead of 146.82 MHz). Check carefully to find your mistake and then press [CLEAR]. You can now enter the correct frequency.

(wr 07/31/98)

Privacy Policy

200-0112

PRO 2020 SCANNER

Faxback Doc. # 21316

To order parts call 1-800-843-7422 or visit your local RadioShack store.

Reference #	Cat.No.	Description	NP Part #
Q6 Q7	11319340	REPLACED BY DX-0162	1N60
	11319373		1N60P
	11319548		1S1588
	10511251	XSTR 2SC2464 CHIP	1TD0022
	11331196	XSTR 2SC1117 BI-POLAR NPN	2SC1117
	11332210	XSTR 2SC2347 BI-POLAR NPN	2SC2347
	11344504	XSTR 3SK77 DUAL GATE N-CH	3SK77
31	10538270	5 SEGMENT	A0123
		ANTENNA, TELESCOPIC	A0307
		FOR SUB-SEE A-0123	A0307
	10540748	ANTENNA, TELESCOPIC	A0530
TC101-107		UNIT DISCONTINUED 1986	AA0000X
TC1	10555514	CAP TRIMMER 10P	C0877
CF101		CAP TRIMMER 20P	C0965
		USE CB0605	C1044
		REPLACED BY CB0605	C1044
L101	10563096	COIL, RADIO FREQUENCY	CA3488
T103		COIL OSC LO	CA4914
T101 T102		COIL RF	CA5261
T104	10567519	COIL, 10.7MHZ	CA7246
T105	10567527	COIL IFT 455MHZ	CA7247
T107	10567634	COIL, IFT 455 KHZ (4202)	CA7844
T106	10567691	COIL, IFT 455KHZ M352-203N	CA8183
CF101	10570216	FILTER, CER 455KHZ	CB0605
	10571909	PKG OF 5	CC102KJBMB
	10571966	.01UF +-5 50V MYL	CC103JJBMB
	10572212	.1UF +-5 50V MYL	CC104JJBMB
		.1UF +-5 63V MYL	CC104JJDM
	10572345	CAP ELECT ALP 50V 1UF +-1	CC105KJBA
	10572451	10UF +-20 16V ALP	CC106MDCA
	10573111	2200PF +-5 50V MYL	CC222JJBMB
		2200PF +-10 50V MYL	CC222KJBMB
	10573657	220UF +-20 10V ALP	CC227MCBA
	10574630	CAP MYL 50V 4700PF +-10	CC472KJBMB
		PKG OF 5	CC473JJBMB
	10575017	4.7UF +-20 35V ALP	CC475MGBA
	11581154	470UF +-20 16V ALP	CC477MDCA
		PKG OF 5	CC477MDCAB
X101	10589497	CRYSTAL, 10.245MHZ	CX0132
	10594109	RESONATOR CERAMIC 400 MHZ	CX0785
XF101	10594737	CRYSTAL, FILTER 10.7MHZ	CX0920
28		DOOR BATTERY	DB0322
D101-104 D106 D108		DIODE FC54M	DX0548
D110			DX0548
D126	10625275	DIODE HC5C-2 4.7V 1/2W	DX1357
D105 D107	10625556	DIODE 1SS85	DX1462
D118 D120 D122-125	10627297	DIODE 1K60 RLF-SL	DX2013
	10627297	USED AFTER DC 1A3	DX2013
		USE MX4760	HA17805P
		USE LM340T8	HA17808P
9	10654622	BUSHING, FOR TELEPHONE WIR	HB0705
3		GUIDE ANTENNA	HB6920
24	10694008	SCREW, MOUNTING BRACKET	HD1673
24		USE HD1673	HD1797
		REPLACED BY HD1673	HD1797
15	10727089	JACK, 2P PHONE 3.5MM	J0960
14	10728640	JACK ANTENNA	J1169

	10729382	JACK RCA	J1297
	10731966	TERMINAL PRESSURE	J4634
		SOCKET 42P IC	J7028
	10740520	STORE STOCK UNDER 270-324	JE0213
13		KEYBOARD	K4540
		WITH CONNECTOR AND PCB	K4540
26		KNOB VOLUME/SQUELCH	K4541
	11468972	IC LM340T8 TO220 T REG 8V	LM340T8
23	10806602	BRACKET, MOUNTING	MB0160
	10808376	W/SPACER	MB1003
	11392339	SYSTEM	MC3357P
	10822757	MANUAL SERVICE 20-112	MS2000112
	10844645	XEROX COPY	MU2000112
IC7	10890051	MC12013P PRESCALAR	MX3251
IC103	10896413	TD62501P SQUELCH CIR	MX4299
	10896421	TC4016BP INTF	MX4300
IC106	10896454	USE LM340T8	MX4303
IC104		TA7521P	MX4437
		SN76007 OUT AMP	MX4554
IC6	10898583	TC40228BP BCD-DEC DCDR	MX4748
IC1		GRE7954 UP	MX4754
IC9	10898609	IC, CD4009CN DIP 16 T BUF	MX4755
IC4		TC5069BP LTCH DCDR/DRVR	MX4758
IC10		HD74LS26P NAND BUF	MX4759
IC2	10901031	IC TC5501 DIP22 T RWM	MX5343
R246 R252	10939080	10 5% 1/4W CBF RES	N0063EEC
R128 R157	10939395	22 5% 1/4W CBF RES	N0078EEC
R167 R268	10939742	47 5% 1/4W CBF RES	N0099EEC
R108 R110 R118 R131	10940187	100 5% 1/4W CBF RES	N0132EEC
R141	10940187		N0132EEC
R147 R170 R172 R184	10940187		N0132EEC
R216 R217 R267 R21 R24	10940187		N0132EEC
R269	10940880	330 5% 1/4W CBF RES	N0159EEC
R143 R171 R192 R206	10941029	470 5% 1/4W CBF RES	N0169EEC
R210	10941029		N0169EEC
R212 R215 R266 R20 R26	10941029		N0169EEC
R117 R139 R151 R155	10941342	1K 5% 1/4W CBF RES	N0196EEC
R156	10941342		N0196EEC
R160 R163 R177 R186	10941342		N0196EEC
R207	10941342		N0196EEC
R229	10941342		N0196EEC
R23 R25 R35	10941342		N0196EEC
R236 R255 R260 R127	10941342		N0196EEC
R13	10941532	1.8K 5% 1/4W CBF RES	N0210EEC
R107 R113 R125 R136	10941680	2.2K 5% 1/4W CBF RES	N0216EEC
R162	10941680		N0216EEC
R176 R188 R205 R233	10941680		N0216EEC
R243	10941680		N0216EEC
R250 R19 R22 R30-33	10941680		N0216EEC
R149 R189 R191 R193	10941904	3.3K 5% 1/4W CBF RES	N0230EEC
R242	10941904		N0230EEC
R251 R262 R245 R27	10941904		N0230EEC
R103 R114 R115 R119	10942118	4.7K 5% 1/4W CBF RES	N0247EEC
R132	10942118		N0247EEC
R138 R144 R153 R165	10942118		N0247EEC
R185	10942118		N0247EEC
R197 R211 R219 R235	10942118		N0247EEC
R254	10942118		N0247EEC
R244 RR1 R6 R10 R36	10942209	5.6K 5% 1/4W CBF RES	N0257EEC
R37	10942209		N0257EEC
R101 R105 R116 R120	10942498	10K 5% 1/4W CBF RES	N0281EEC
R140	10942498		N0281EEC
R145 R154 R158 R168	10942498		N0281EEC

R173	10942498					N0281EEC
R175 R180 R182 R218	10942498					N0281EEC
R2-5 R7-9 R15 R34	10942498					N0281EEC
R220	10942498					N0281EEC
R221 R223 R226 R234	10942498					N0281EEC
R237	10942498					N0281EEC
R238 R248 R249 R259	10942498					N0281EEC
R270	10942498					N0281EEC
R129 R150 R169 R198	10943108	33K	5%	1/4W	CBF RES	N0324EEC
R16 R17	10943108					N0324EEC
R29	10943108					N0324EEC
R199	10943165	39K	5%	1/4W	CBF RES	N0330EEC
R209 R214 R224 R240	10943611	100K	5%	1/4W	CBF RES	N0371EEC
R228	10943611					N0371EEC
R39	10943611					N0371EEC
VR1		POT	SQUELCH			P7153
RA1		RESISTOR	ARRAY 100K			RX0214
RA2		RES	ARRAY 100K			RX0252
T108	11097169	TRANSFORMER,	POWER			TA0790
	11097169					TA0790
10		USE	WB0143			W1000
		REPLACED BY	WB0143			W1000
	11113958	WITH	FUSE			W2306
10	11121639	CORD,AC	L6.5F BLACK			WB0143
		PCB	LOGIC ASSY			X8797

(This list was generated on 07/08/2005)

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